RUSTIC ADORNMENTS FOR HOMES OF TASTE

BY

SHIRLEY HIBBERD

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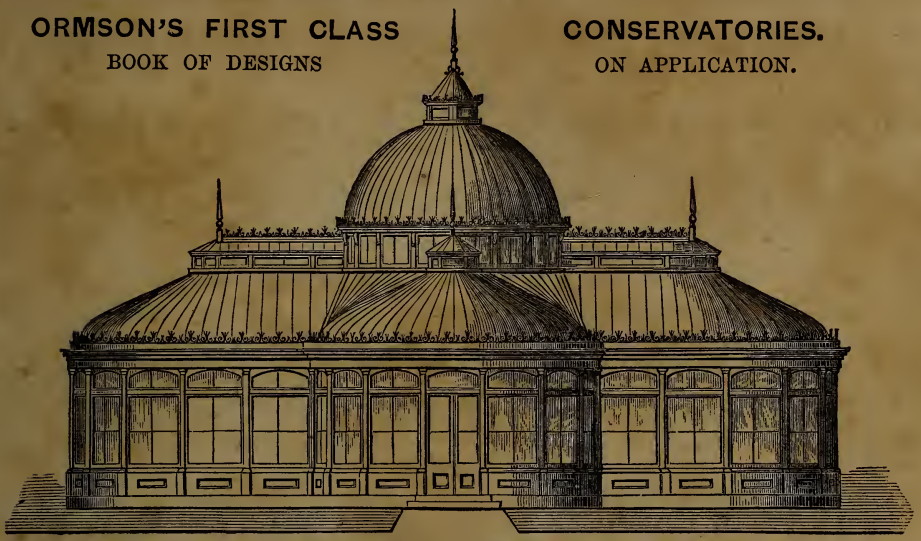

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His hope is treacherous only whose love dies
With beauty, which is varying every hour:
But in chaste hearts uninfluenced by the power
Of outward change, there blooms a deathless flower,
That breathes on earth the air of paradise.

WORDSWORTH.

RUSTIC ADORNMENTS

for

HOMES of TASTE

BY

SHIRLEY HIBBERD

With Coloured Plates from Drawings by H. Briscoe

London
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RUSTIC ADORNMENTS

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M DCCC LXX.

PREFACE.

THE first edition of "Rustic Adornments" was published on the 1st. of February, 1856. In the course of about six months it was reported "out of print." The second edition was published on the 10th. of June, 1857. This edition was quickly disposed of, and the demand still continued. It scarcely need be said that the author intended immediately to reproduce the book; but it may be proper to explain how in spite of this intention, which was never abandoned, twelve years have elapsed, during which the work has been constantly called for, although the Publishers have not had a single copy to sell. In the first place, a thorough revision and some enlargement were determined on; and in the second place, the author's engagements left but little of the proper kind of leisure for performing the task according to his own estimate of its magnitude. Thus it happens that from 1857 to 1870 there has been no republication of this book, although it has been constantly "inquired after," and every encouragement for its reproduction afforded, that any author, however timorous, could desire.

In the preparation of this edition many alterations of the original text have been made, but the plan remains the same, and most of the engravings used in the second edition are again employed,

with such additions both in wood and colour as increased experience and observation suggested as desirable.

Fortune has hitherto smiled upon the book, and as will now be seen, she smiles most benignantly on this preface, for there is something now to be said that may actually be worth reading—a most unusual circumstance perhaps. Very shortly after the publication of the second edition, an American edition appeared, of course without the author's permission, of course, also, without any participation of the author in the profits; but, O ye Gods, how gloriously interesting is the case to those who cry for international copyright —the book appeared *under another title, and with another person's name on the title-page as that of the author!!!* Perhaps the case as here put is overstated, and that makes it still more interesting; the book was not actually copied *verb. et lit.!* but was mangled and modified in much the same way as a rough boy would treat his sister's doll: the rough boy, however, would exclaim "I didn't do it!" whereas one Edward Sprague Rand took credit for the "alterations," when, by an exposure of the fraud, he was compelled to adopt some sort of defence. In "The Nation" newspaper of February 28th., and March 14th., 1867, no less than seven columns were devoted to an analysis of Mr. Rand's appropriations, which he had published under the title of "Flowers for the Parlour and the Garden." A thousand thanks are due to the "The Nation" for this defence of a single English author, best abused amongst a thousand, not only for the personal service, but for whatever aid was thereby given on that side towards the establishment of an international copyright. It is impossible to make room here for particulars of this transformation, but it is fair to Mr. Rand to add the substance of his defence, which was to this effect—that his publisher sent

him leaves torn out of a book; he knew not what book. He never inquired who was the author of the book, or whence it came; but adopted text and pictures at his own free will, or altered both so as to spoil their sense and connectedness, and took care not to acknowledge his indebtedness to any known or unknown source of information. Modest, amiable, unselfish man!

As to the purport of "Rustic Adornments," that, it is to be hoped, will be best explained by a glance at the following pages. If it be needful to explain it here, the fewest words must suffice. Its purport is to enlarge the circle of domestic pleasures and home pursuits; to quicken observation of natural phenomena, so that the meanest of familiar things shall become eloquent in praise of beneficence and beauty; to strengthen family ties and affections by multiplying the sources of mutual sympathy; and to cheer the loneliest with amusements that tend to cheerfulness, and afford solace and society, where, but for such reliefs, life might become unbearably monotonous and wearisome. Whatever may be our views of life, religion, and duty, such recreations as are herein described are not likely to clash with them, but they may help the soul in its aspirations by conducting it away from disturbing scenes, and surrounding it with an atmosphere of health and peacefulness. Happy he who by experience can enter into the full meaning of Coleridge's exquisite lines on the lark in his "Tears in Solitude."

"Here he might lie on fern or withered heath,
While from the singing lark, that sings unseen,
The minstrelsy that solitude loves best.
And from the sun, and from the breezy air,
Sweet influences trembled o'er his frame;
And he, with many feelings, many thoughts,

Made up a meditative joy, and found
Religious meanings in the forms of nature;
And so, his senses gradually wrapt
In a half sleep, he dreams of better worlds;
And dreaming, hears thee still, O singing lark,
That singest like an angel in the clouds."

S. H.

Stoke Newington, April, 1870.

To prevent disappointment to readers of this work it is respectfully announced that the author has not recommended in these pages any particular trader or trading interest, and has no interest of that sort of his own to promote; therefore it is desired that no applications will be made to him for professional services in laying out grounds, the construction of plant houses, apiaries, etc., etc. The author has long since given up business of that kind, having other occupations which demand constant attention, and employ the whole of his time.

Letters of inquiry, arising out of subjects herein treated, cannot be attended to; but in the periodical publications with which the author is connected, all queries consonant to the general scope of those works will have prompt and careful attention, if addressed in the usual way to the care of the Publishers.

The author's garden is not open to public inspection: it is, in the strictest sense of the word, a private garden; and, moreover, it is devoted chiefly to experimental purposes, which are reported on from time to time, but while in progress are altogether unsuited to interest visitors, or afford them any useful information.

Whatever is sold from the experimental garden passes through the hands of the trade, and neither plants, seeds, nor aught else can be supplied under any circumstances to private purchasers.

Advertisements of a kind likely to be useful to the reader have been admitted at the close of the volume. Respecting them, the author cannot assume even the shadow of responsibility, but the greatest care has been taken that none should obtain admission except from houses of known respectability.

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THE HOME OF TASTE.

Home! in that word how many hopes are hidden,
How many hours of joy serene and fair,
How many golden visions rise unbidden,
And blend their hues into a rainbow there!
Round home what images of beauty cluster,
Links which unite the living with the dead,
Glimpses of scenes of most surpassing lustre,
Echoes of melody whose voice is fled.

J. W. FLETCHER.

AMONG the emblems of our nationality, not one is more strongly cherished by us than OUR HOME. We pride ourselves on the strength and healthiness of our domestic life, and we challenge the world to produce an example of a people more fondly attached to their native soil, or in whom the fireside affections have a broader development, or a higher aim. We cherish the

chimney corner where we first were blest by parental kisses, and through "the aisles of memory" its ruddy glow shines on our grey hairs, and warms our hearts as we hurry to the grave. At any period of life there is, with the majority of us, no dearer object of recollection than remembered scenes of the Home wherein we first lisped "Our Father," and no more hopeful subject of speculation and conjecture than the Home we have or, by the help of God and a noble purpose, are building up, in which to teach that same simple prayer to children of our own.

It is because we are truly a domestic people, dearly attached to our land of green pastures, and shrubby hedgerows, and grey old woods, that we remain calm amid the strife that besets the states around us, proud of our ancient liberties, our progressing intelligence, and our ever-expanding material resources. Those resources daily multiply the means of exalting our social life, and invention keeps pace with the demands of an improving civilization; so that while

> "The thoughts of men are widened by
> The progress of the suns,"

the facilities for calm and healthful enjoyment increase with the growth of more elevated desires. The "Home of Taste" is one of the latest fruits of the high tone to which social life has attained in this country of late years, and its complete development may not be so far off, but that the present generation may witness the union of Nature and Art in happy ministration to human sympathies within doors.

We know already that the luxuries of refinement are no longer monopolized by the wealthy, that the merchant is not rendered sordid by commerce, but that he can delight in the strength of Angelo and the grace of Raphael; the ledger does not dwarf the trader's soul below the appreciation of Titian's lights or Rembrandt's shadows; and the persevering plodder, who from four to six does battle with armies of statistics, can retire to his suburban villa to rejoice as a happy soul in the midst of his family, or fondle his tame birds with the affection of a child. The aboriginal nature can never be drummed out of us, let visionaries say what they may; through all the varying circumstances of life, let the whirl of excitement be never so rapid, or the stupor of despondency never so profound, that which ministers to our perceptions and enjoyments of beauty, grace, and truth, serves at once as rest, and solace, and refreshment. Therefore we build up Homes of Taste wherein to find

epitomes of the natural world, and where, secure from the commotion and dust that prevail without, we may cherish the affections that lie deepest in our nature, and from which spring the noblest and most enduring results in the exaltation of our intellectual and spiritual faculties.

A Home of Taste is a tasteful home, wherein everything is a reflection of refined thoughts and chaste desires. It is a school of the heart, in which human sympathies teach profounder lessons than are found in books, and the ornaments of walls and windows suggest a thousand modes of being cheaply happy. In such a home Beauty presides over the education of the sentiments, and while the intellect is ripened by the many means which exist or the acquisition of knowledge, the moral nature is refined by those silent appeals of Nature and of Art, which are the foundation of Taste. If Taste is an application to nature of the same faculty which in morals enables us to distinguish between right and wrong, then the Beautiful is the highest form, or rather the embodiment of the purest ethics; and to be in constant communication with it, drawing our inspirations from its most palpable phenomena, is to place our spiritual natures under the guidance of a goddess who cannot lead them wrong. No matter in what form the cultivation of Taste may manifest itself, in paintings and sculptures; in the analysis of scenery; in the grouping of flowers; in the embellishment of the window or the table; in the cultivation of criticism, and the appreciation of what is true and good in Art generally; refinement of manners, sensitiveness of personal honour, kindliness of feelings, and a deeper devotion of religion will be its sure attendants. We cannot come into the presence of any work of high-class art without at the instant experiencing emotions that increase our happiness, nor can we take interest in the simplest pursuit of a leisure hour, if that pursuit be pure and pleasing, without at once passing into an atmosphere of higher moral purity than we breathe at other times, amid

"The weariness, the fever, and the fret,"

that, without such an antidote, harden the heart by degrees, restrain the aspirations of the inner life, and arrest the development of our spiritual capabilities. Such "enchantments are medicinal, they sober and heal us. They are plain pleasures, kindly and native to us."

But the Home of Taste is not necessarily the result of a lavish expenditure —the most humble may command it. Though the several Rustic Adornments treated of in this work admit of extension, commensurate with the most liberal

outlay, there is not one but is in some measure attainable by those who have but little leisure and most narrow means, and some indeed may be, and have been cultivated most successfully by those who could not aspire even to the ordinary luxuries of middle life. If the poor man cannot have his picture gallery, he can still gratify his love of art by embellishing his walls with copies of works of great masters, brought within his reach by the multiplying skill of the copyist and the engraver; if he cannot have a library, paneled with palm branches, and containing a collection of Aldines on vellum, and Caxtons worth twelve thousand guineas, he can still command elegant editions of the greatest historians, philosophers, and poets, to whom God ever gave the gift of expression. If he cannot afford pictures, he may have a "garden of delights;" and if palms and orchids are forbidden fruit, he may every day experience a subdued but healthy pleasure amidst ferns and flowers: the rose will shake into his heart her perfume, and the lily recall to him the teachings of the Lord. In the adornment of the home it does not require a princely fortune to set up a vase of flowers, or an aquarium, or a stand of bees that shall sing to their master all day long, and entrap every spare moment of leisure he may be able to afford to "shepherd them." He who lays out his garden in accordance with correct principles of taste, may find in it as much amusement, and as genuine a solace from the cark and care of life, as if it were a domain of thousands of acres—perhaps more so, for it is his own work, it represents his own idea, it is a part of himself, and hence redolent of heart-ease.

It is an error common to writers to believe that the special subject on which the pen is engaged is of pre-eminent importance, and perhaps I may be yielding to this common weakness when I suggest that the embellishments of the household embrace the highest of its attractions apart from the love which lights the walls within. The prose of life is good, food, clothing, safety must be first secured; but the poetry is better, for though the body must be fed, it is chiefly because of the soul it shelters that it must be kept sound and clean. The pleasures of the garden, the tending and taming of household pets, the culture of choice plants in the greenhouse and the window, seem to me much more remunerative, both intellectually and morally, than even the study of the higher departments of art, because of their suitability to all tastes and means, and their directly educative power, for they keep us near to nature, and compel us to be students of the out-door world, whence many noble inspirations and humanizing teachings and devotional impulses are drawn. "It seems as if

the day was not wholly profane, in which we have given heed to some natural object."

It would be an anomaly to find a student of nature addicted to the vices that cast so many dark shadows on our social life, nor as a matter of fact can we readily recall an instance of a naturalist or philosopher who has been known as a bad man, but of such as have been revered and loved for goodness the names are so numerous that we might liken them in plenitude as well as their nature to the stars in heaven. But to avoid any severe test, is it not true that the most genial natures are of the homely sort, attached to the fireside; cultivators of rural tastes in some form or other; given to simple hobbies that keep the attention fixed on things that breathe purity, and quiet, and peace, answering to their own aspirations? They are healthy folks, healthy in mind as well as in body, and to clear perceptions add the impulses of generous hearts. We must receive the kingdom of heaven as little children, and shape our lives in childish ways to be worthy of it.

In a certain sense the Home is the outside of a man; it is an external vesture, and more or less, but always in some degree, a visible embodiment of his mental character. The man of intellect and taste will impress on everything about him an air of usefulness or elegance, and will make the best of the roughest materials that fate may cast in his path. Architecture—the highest of the domestic arts—springs out of the desire of the mind to dwell in a fair exterior, and to be surrounded by harmonious forms. In this, as in other of the useful arts, elegance, comfort, and convenience usually go hand in hand; and while deformity is invariably more expensive in every sense than grace, so the well-built and tastefully-adorned mansion more readily meets our domestic requirements, and in accordance with our station, affords proper scope for embellishment within and without. Sir Henry Wotton says, "Architecture can want no commendation where there are noble men and noble minds;" and it is not to be doubted that if ordinary residences were constructed in accordance with correct principles of taste, the dwellers in them would attain a higher status in mind and morals, for the character is powerfully impressed for good or evil by what surrounds it permanently. Why should the eye be compelled to gaze on ugly lines and awkward angles, false proportions, and incongruities intended as ornaments, when symmetry is at all times cheap, and accuracy of form the most useful and convenient? If builders were equal to their work we should read art-lessons in the streets, instead of perpetually deploring the violation, in bricks and mortar, of every law which should control domestic

architecture, save and except the one primary law that a house must have a foundation. However, in this matter we witness the beginning of a revival; true taste has ceased to be esoteric, and in all our cities evidences abound, to testify that our people are not satisfied with bread alone, but crave the heavenly teaching of beauty as a reflex of the divine nature. Art is religious or it is nothing, every touch of grace in outward form is a rebuke to sinfulness, every work of art is a minister of morals to those who can understand.

Lord Bacon says, "Every man's proper mansion, house, and home, being the theatre of his hospitality, the seat of his selfe-fruition, the comfortablest part of his own life, the noblest of his sonne's inheritance, a kind of private princedom; nay, to the possessors thereof, an epitome of the whole world, may well deserve, by these attributes, according to the degree of the master, to be decently and delightfully adorned."

Wealth is certainly a blessing when it is made the instrument of increasing human happiness, and in the gratification of a love of elegance money is certainly a powerful instrument. Still the Home of Taste is within the reach of all, it is the mind more than the money that must make it. Spiritual life will give radiance to a cottage, pure pleasures will sweeten the humblest lot, while the noblest productions of genius may even contribute to the gloom of the mansion, where moral and religious worth are unknown. Whatsoever we look upon reflects our own mood, we see ourselves perpetually, as if all nature and art were but repetitions of a mirror.

"Our sleeping visions, waking dreams,
Receive their shape and hue from what
Surrounds our life."

Where the counsels of wisdom preside over parental love, where those "whom God has united" remain in unity under the bonds of a beautiful affection, than which

"All other pleasures are not worth its pains;"

where woman appears in her true gentleness, and the children grow up in the love of parents and the fear of God, there is a Home of Taste, a Home of Virtue, of Mental Discipline, of Moral Worth, Domestic Affection, and Religious Aspiration. "Round it all the Muses sing;" everything within takes the semblance of the souls that preside over it; the simplest things acquire grace and meaning; vulgarity, meanness, and vice dare not cross the threshold

—ennui cannot find its way there, petulance is smiled out of countenance, and temper is rebuked by the pacidity and suggestiveness of the surroundings. "If the Lord build not the house, they labour in vain that build it."

The mind, like a sensitive plate in a camera, receives impressions which become permanent pictures in the memory, and these pictures refresh or depress us according to their tone and tinting. In meditative moments we turn them over as the leaves of a book, and our hearts leap with joy as the pictures of happy times and generous deeds are revealed. But they sink despondent under a weight of regrets as the great blanks that represent wasted opportunities, or the more demonstrative mementoes of vice and folly, break into the field and pass drearily in review. Hours well spent, like fruits well grown upon the bough, give gladness for the present and afford enjoyment for the future as memory recalls them, and that inward gratulation follows which only the satisfied conscience can allow. Memory rides above the will, and to forget is a pleasant or a painful impossibility according to the complexion of the reminiscence that flashes upon the inward eye. So for the sake of the future when the calm days approach, and remembrances hold us more strongly than the events of the passing hour, it is well that we should shape our pleasures, in common with our more serious occupations, in accordance with the demands of reason and virtue. The perfection of dullness and indifference may be surest attained by devotion to sordid pursuits and selfish aims: it is the outgoing of the affections in honest sympathies and kindly acts that will most certainly tend to a spirit of joyfulness. True mirth is of a quieter aspect than the world allows; and there is an inward cheerfulness that makes no noise and appears not to sense, that will ever be welcomed as a foretaste of the blissful condition of the happy dead to the heart that faith has sanctified. For the sake of all around us, who may be blessed or banned by our example and works, no less than for our own sakes, that happy pictures may be painted on the memory to beautify the sunset of our lives, we must shape our course in all things so that "Hope may never lose her youth," and that every individual endeavour shall be as seed sown in the field of the heart to bring forth "the peaceable fruits of righteousness."

"Thrice blessed whose lives are faithful prayers,
Whose loves in higher love endure;
What souls possess themselves so pure,
Or is there blessedness like theirs?"

In the Home of Taste we find abundant resources for recreation, and many an antidote to care and folly. Its least embellishments fill the mind with a sense of the exhaustlessness of form and colour in this orderly universe; there are household pets that daily teach us we may rule by love and not by fear; there are gatherings of all kinds from the world of art and the world of nature that demand attention, and the exercise of skill, every one of which represents an idea and persuades us to reflection; while every labour they require brings its high reward in mental activities and the gratification of ennobling desires. But above all there is the ripe domestic life which forms the true centre of this circle of adornments, heightened by them in its ever-growing appreciation of what is good in man and beautiful in nature, and in both representative of the Wisdom, Power, and Goodness of the Almighty.

"Domestic happiness, thou only bliss
Of Paradise, that hast survived the fall!
* * * * *
Thou art the nurse of virtue, in thine arms
She smiles, appearing, as in truth she is,
Heaven-born, and destined to the skies again.
Thou art not known where pleasure is adored,
That reeling goddess, with the zoneless waist
And wandering eyes, still leaning on the arm
Of novelty, her fickle, frail support;
For thou art meek and constant, hating change,
And finding in the calm of truth-tried love
Joys, that her stormy raptures never yield."

COWPER.

BOOK I
ADORNMENTS OF THE HOUSE
THE MARINE AQUARIUM.
THE FRESH-WATER AQUARIUM.
THE FERN CASE.
THE WINDOW GARDEN.
TABLE FLOWERS.
CHAMBER BIRDS.
A.F.Lydon. Del.

MARINE AQUARIUM

"A sounding grotto, vaulted, vast,
O'erstudded with a thousand, thousand pearls,
And crimson-mouthed shells with stubborn curls
Of every shape and size, even to the bulk
In which whales harbour close, to brood and sulk
Against an endless storm. Moreover, too,
Fish—semblances of green and azure hue,
Ready to snort their streams."

KEATS.

CHAPTER I.

THE aquarium is an established household ornament; and fully entitled to the first place in the list of recreations we have engaged to discourse upon. It graces the drawing-room, the conservatory and the greenhouse; is a welcome and highly-prized addition to the student's resources in the acquisition of knowledge; it extends the sphere of domestic education for the young, enlivens the solitary hours of the invalid, and gives delight to everybody.

Considered as a domestic ornament it is insurpassable, and, while in its humblest form it presents a constant succession of beautiful and novel objects, so to all the accessories of artistic decoration it adds the charm of life in some of its most beautiful and strange developments. The merest glimpse of water is always refreshing to the eye; its clear, cool aspect, the mingling of many colours and forms; the peculiar growth of aquatic plants, and the still more curious forms and movements of aquatic animals, combine to form an assemblage of delightful and ever-changing pictures. The Naiads need no longer dwell in forests lone, dipping their white feet in streams haunted only by the robin and the humble bee, but may sport in gay drawing-rooms, in homely parlours, in the study of the recluse, or the chamber of the valetudinarian. No longer need they fear winter storms and March hurricanes, but shall henceforth have homes within sheltered walls, impervious to frost, and shadowed by curtains, where love whispers, and young children play.

To the naturalist the aquarium opens up new studies of the choicest wonders of the deep sea. Those departments of zoology which have for their regard the creatures of mid-ocean, or even of the pebbled shore, have hitherto made the slowest and least satisfactory progress of any; now they are to experience a "sea-change," for the dredge brings up the

> "Pale glistening pearls, and rainbow-coloured shells;"

and by the preservation of the creatures in their own element, and under circumstances approximating in character to those in which they were produced, we may study their habits and economy even to the minutest particulars.

It is mostly in the season when the deep green of summer begins to wane, and the first tinge of autumnal orange appears like a blotch of lost sunshine on the landscape, that our thoughts revert to the vast, and unchangeable, and mysterious sea—

> "The glorious mirror, where the Almighty's form
> Glasses itself in tempests."

Unchangeable it is, though relatively ever changing; unchanging in its character, its office, and its plenitude of life, yet changing to us in its many moods of storm and calm, the glittering of its white foam in the sunshine, and the roar of its stormy waters in the awful darkness. We have never seen enough of the sea, for it never tires, though we visit the same bay, or the same creek,

or the same breadth of snow-white beach, day after day; for the water has a life of its own, and its successive phases of playfulness, rolling grandeur, gentleness, and power, chain the mind to it; and while intellect strives to master some of the problems its phenomena suggest, the imagination and the fancy find therein inexhaustible poetry, indescribable beauty, and all the elements of fear, and joy, and wonder, and repose. Besides its own individual life, which compels us to invest it with some of the attributes of a creature gifted with purpose and volition, and capable of both love and hate to man, it holds another life within it, which the mind reaches after, which the hand reaches after, and, like another and a new creation, demands that man should stand in the midst and name the creatures. The fresh sea breeze—the calm expanse of blue, shading into mists flaked with distant sails on the horizon—the towering moorland and the grandeur of the cliffs, that show the scars of centuries of storm and battle—the music of the breakers, following in quick succession along the yellow strand, maintaining there a constant line of whitening foam—the vastness of the expanse, and the nothingness of man in the presence of it;—these do not suffice us as we stand upon the shore, yearning after knowledge of the creation that is hidden in the depths. There is one comfort: the conquest of the earth, given to man as a high and blessed privilege, extends to the sea also; it is to him a storehouse of wealth, to be sought in danger; and a storehouse of wisdom, to be explored in reverence; every one of its strange people offering a fresh lesson of the infinite goodness and infinite power of the Source of all things.

It is in this search that we betake ourselves to the aquarium, and find it of priceless value, because it places before us for daily observation, in the quiet retirement of our homes, things born and nurtured in the depth of great waters, and enables us, in places far away, still to believe that the sea is near us in the tiny imitation of it we have set up for our amusement. The marine aquarium ranks as much higher than the river aquarium as the sea itself transcends in glory the smallest of the hillside rivulets that hurries towards it as its final home. The range of subjects it embraces is a hundred-fold more extensive and wonderful than the river tank can ever be, and it provides occasion for the study of creatures that lie out of our ordinary path of observation, and which charm us by their novelty and beauty no less than by their structure and habits and several phases in the order of created life. Therefore the setting up and managing of a marine tank is a higher task than that of furnishing one with fluviatile subjects, and, like all other such enter-

prises, it is less easily accomplished, and calls for a larger exercise of judgment, and a more complete knowledge of first principles.

As it is not intended to treat any subject scientifically in this volume, the reader is desired to dispense with discourses on the reciprocity of influences, chemical, mechanical, and vital, concerned in the maintenance of "the balance" which it is the first object of the manager of an aquarium to secure.* Neither shall we attempt to trace the history of the experiments by which this valuable auxiliary to scientific study has been established on so firm a basis that the aquarium has become a public institution; and no one interested in the subject would willingly forego the pleasure of visiting Paris, Hamburg, and Berlin, expressly to see what has been accomplished in this respect in those cities. A good public aquarium is a thing as yet unknown in the British Islands, but we may at all events learn how it should be constructed and managed by the examples afforded in continental cities. The aquarium is to be regarded here as a recreation, and though we must be practical, we need not be dry, and we do not intend to indulge in technicalities or scientific disquisition beyond the most obvious necessity of the practical treatment required.

An aquarium, whether filled with fresh or salt water, and no matter whether large or small, is a prison; and as birds in cages require special care to compensate them for confinement, so gold-fishes and sea-anemones must be looked after, with love of course, for there can be no success without that, but also with skill, for the merely putting so many creatures into a tank is not to establish an aquarium. A few fundamental principles must be borne in mind at every stage of the enterprise. These may be explained in few words. In the first place, then, all the inhabitants of the waters, the lively fishes, the sleepy actiniæ, the awkward crabs, all without exception, *breathe atmospheric air*. It is true they do not gulp in dry air as we do, but they sift out, as it were, from the water, the air contained in it, and if it so happens that it contains none they die, and there is an end of them. It is usually said in the books that it is absolutely necessary to keep healthy vegetation in an aquarium for the purpose of generating oxygen to supply the animals with the means of breathing. It will be shown further on that this is not absolutely necessary, and in some cases not even desirable. Nevertheless, oxygen the animals must have, and to secure its constant presence in the tank must be the first care of the keeper of an aquarium.

* *Vide* article entitled "The mysterious Balance," in "Brambles and Bay Leaves."

Remembering that the tank is a prison, we must remember also that prisons are hurtful to life if over-crowded. In the measureless volume of the sea itself, there is a measureless and inexhaustible supply of oxygen for all the inmates of the depths. Every crest that forms on the top of a wave, every streak of froth and foam, consists of atmospheric air entangled in the water. There is no such agitation of the surface of the water in a tank to refresh it in this way unless artificially produced; nor does the fresh breeze play over it perpetually; nor can it nourish forests of vegetation as the sea does, serving as breweries of oxygen for its stores of animal life. It follows from these considerations that an over-crowded tank is likely to become a dead-house. The prudent practitioner will always keep fewer animals in a given space than might be kept, rather than proceed to the other extreme, and risk the whole through aiming at too much.

The question is of the utmost importance. It is a matter of common experience and observation that small quantities of water are quickly affected by changes of temperature, while large bodies are affected slowly, and never to such an extent as the smaller quantities. A small river varies in temperature more quickly and extensively than a large one, and all rivers vary in temperature more than the sea in the same latitudes. The larger the aquarium, therefore, the safer is it against extremes of temperature. Moreover, if built of heavy materials that are comparatively non-conductive of heat, the safer will it be during periods of great heat in summer, as, before the heat of the day can penetrate the mass, the cool of the evening will have returned; and perhaps the opening of a window, and the sprinkling of water on the outside of the vessel, may suffice to keep the temperature to a safe standard. Slate is one of the best materials for marine tanks, because of its great power of resisting sudden changes of temperature. Metal is the most convenient material in which to make rectangular vessels, but it is not the best in other respects, though in many cases it may be used with safety and advantage.

Between marine and fresh-water aquaria there are many distinctions independent of the radical distinctions indicated by their names. The aëration of a fresh-water vessel is a matter of comparatively small consequence as compared with the difficulties that arise through deficiency of oxygen in a marine aquarium. So again, variations of temperature are less hurtful to fresh-water than to marine animals, and metal tanks may be employed for river fishes, though most unfit for genuine mariners. Other distinctions will be pointed out as we proceed. It is sufficient for the present that we have regarded the aquarium

as a world in miniature, subject to influences the same in kind, however different in degree, to those which prevail in the economy of the great depths where God has hidden as it were many of His most wondrous handiworks, as He has also hidden knowledge of other kinds from us until we for ourselves search it out.

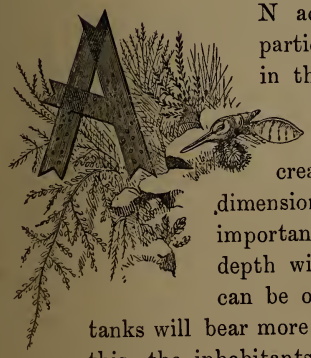
Our little systems have their day;
They have their day, and cease to be:
They are but broken lights of thee,
And thou, O Lord, art more than they.

CHAPTER II.

TANKS FOR MARINE AQUARIA.

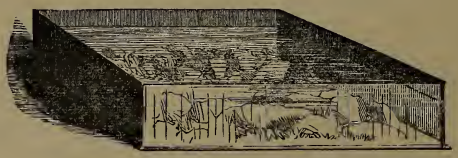
"I see the shipwrecked mariners, a bold Phœnician band,
Gathered around their sea-weed fire, upon the ocean strand;
And mark the wonder and amaze their dusky features wore,
When the first glass before them lay upon the sandy shore."

ELIZABETH PRIDEAUX.



N aquarium must be constructed with a view to the particular purpose it is intended to serve. As remarked in the general observations on first principles, one and the same form of vessel will not answer equally well for marine and fresh-water collections. Marine creatures are not so easily kept as river fishes, and the dimensions and forms of tanks are matters of the very first importance. For instance, we may have river tanks of any depth without fear of losses, because the supply of oxygen can be obtained more readily and more abundantly; and the tanks will bear more light than would be safe for marine vessels. Besides this, the inhabitants of river tanks are possessed of higher powers of locomotion, and can travel where they please within the limits of the vessel; but a sea-anemone, or a star-fish for example, will be likely to travel to the bottom, and die there, for want of the life-sustaining element. Therefore it is important that whatever are the dimensions or forms of marine tanks *they must be shallow*, and the object sought in determining their forms and sizes should be to expose as large a surface as possible to the atmosphere, consistent, of course, with the cubical contents of the vessels. If they were made so shallow as to afford only just sufficient depth for the creatures to be

quite immersed, it would be far safer than to proceed in the other direction, of giving more depth than needful. Take account of whatever aquarium failures you can remember amongst your friends, and you will invariably find that the vessels which caused the most trouble and gave the largest per-centage of losses, were over a foot deep, and if we adopt for marine stock the rectangular vessels that were made in plenty when the aquarium first became popular—vessels that were generally constructed with four sides of glass and a depth equal to half or more of their length—we shall consign to a tomb every item of marine stock committed to it. Instead of preservatories such tanks are sepulchres; river fishes may need no better, but marine zoophytes soon perish in them.



Rectangular Rock-pool Tank.

You must have observed, if at all conversant with these pursuits, that marine zoophytes consigned to a glass or earthenware dish while the tank is being prepared for them, exhibit every sign of vigorous health. When transferred to the tank the trouble and vexation begin; the conclusion may be drawn therefrom that the dish is the best place for them, and the tank the worst. It is a common mistake to consign marine animals to deep tanks in which they are more likely to perish than prosper. True, the sea is deep, and true also that most of the creatures kept in tanks are from its shores, where they are often laid bare by the receding tide, or with the merest film of water over them, to preserve them cool and moist in the sunshine. But there is another reason why we must not be led astray in supposing that deep vessels offer the best conditions for our purpose. The sea is too vast a mass in itself to bear comparison as to its internal economy with a tank containing but a few dozen, or even a few hundred, gallons of water. Its constant motion suffices to entangle and carry far down below the surface immense supplies of atmospheric air, and its abundant vegetation insures the most complete aëration of its

waters. Therefore, for the pelagic or deep-sea life, shallow tanks are still the best, and if you are at this moment puzzled how to make a deep vessel answer for marine stock, give it up, and provide yourself with one of proper make and character. These shallow vessels, made expressly for beginners, may be imitated in an inexpensive way by means of a glass dish, an earthenware foot-bath, or any other vessel not metallic, of similar form and dimensions.

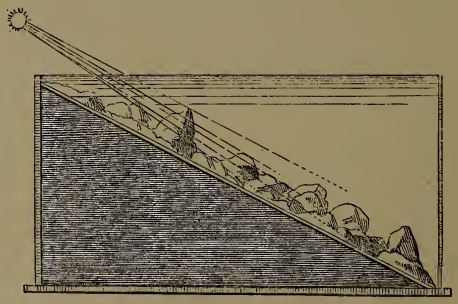
The very best and cheapest ready-made vessel in which to preserve a few sea anemones is a glass dish, such as is used in dairies for cream, or the glass which forms the lower half of a common fern-shade, as here figured.

Circular Glass Rock-pool Tank.

From this simplest of all forms of vessels let us proceed another step. The tanks with four sides of glass admit a vast deal too much light; which is not only injurious to marine animals, but causes the vegetation to become rampant and unmanageable. Instead of a velvet-like growth of minute *Algæ* on the rock-work, involved ropes of *Confervæ* appear, or, what is worse, the water becomes opaque with "green stuff;" there are more spores set free than can find resting-places, and they float in the liquid, and make it of the consistence of pea-soup. Light alone must not have all the blame, for heat is also a powerful agent to bring about such a state of things. It is evident, therefore, that the heavier the vessel is in bulk, proportioned to its size, the more slowly will it be affected by heat; a heavy non-conducting opaque material should largely predominate in the construction of the tank, and nothing has hitherto been found so suitable as slate. The lighter and more fully illuminated the vessel, the less is its value for marine purposes; it must be heavy, and but

partially open to the effect of light, and then an equable temperature is obtained, and a more constantly pellucid state of the water. Mr. Warrington's name must have honourable mention here, as the inventor of the slope-back tank, which realizes the conditions of success more completely than has been accomplished by any and every other means.

The object sought to be accomplished by this form of vessel is a closer imitation of the conditions under which marine animals exist in their native waters. *There* the light which reaches them is wholly vertical, or at least the laterally-refracted rays are but of small account. In the slope-back tank the back and ends are of an opaque material, and light is admitted from above only, so that the tank is in itself the closest possible imitation of a rock-pool, with the advantage of affording an uninterrupted view of the contents. The form in which these tanks were originally made has been improved upon, as shown in the annexed cut. After the shallow square tanks and the glass pans,

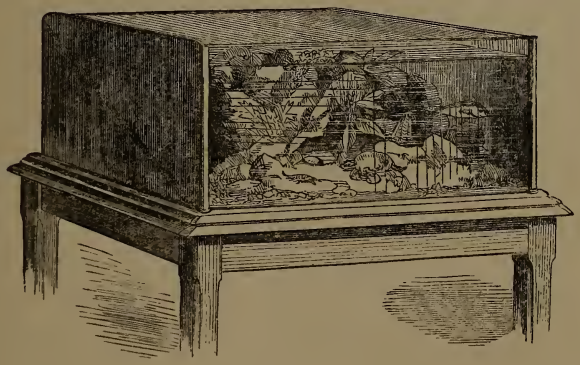


Water Chamber Tank.

these are certainly the next best in efficiency, and, so far from being inelegant, nothing can surpass or even equal the beauty of the scene they present when well stocked, the subdued light being in favour of the view rather than against it. Were it otherwise the health of the inmates would be a sufficient compensation, for in a matter of this sort it would be absurd to advocate any form of vessel, however elegant, which did not fulfil the conditions essential to the preservation of the creatures.

Let us consider for a moment what are the advantages of this form. Owing

to the slope of the back it can be fitted and unfitted more quickly than any other kind of vessel, except the little shallow ones already described. In fitting rockwork, not a particle of cement is needed; hence, instead of losing the whole stock two or three times over, as is the case sometimes when cement has been used, and has been supposed to be properly seasoned, the risk from that danger is reduced to *nil*. Any rough non-metallic mineral may be piled upon the slope in a few minutes, tufts of *Algæ* inserted if desirable, and removed again when they decay, without the smallest disturbance of the general furniture. Better still, the most beautiful and appropriate background may be made up of old serpula, oyster, and other shells; blocks of coral, and such light rough *débris* as will be sure to accumulate in the hands of an aquarian. Oyster shells, incrusted with serpulæ, balanæ, and other small marine masons, add nothing to the weight of the vessel, yet serve all the purpose of heavy rockwork; and if the spontaneous vegetation so necessary to the success of the tank does not appear on them with sufficient profusion, a few pieces of mica-schist may be mixed with them and left alone, and there will soon be plenty.



Water Chamber Slope-back Tank.

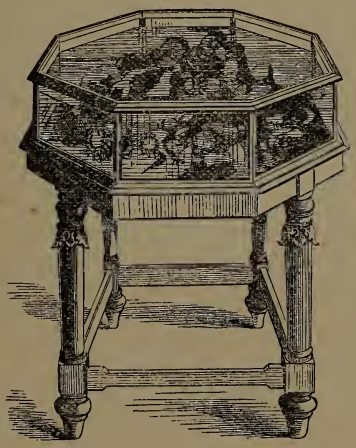
Another advantage of these tanks is their strength. When properly made, they will last a lifetime without becoming leaky, which cannot be said of any vessel having four sides of glass. Perhaps four-fifths of the glass tanks made and sold at the first start of the aquarium are now in lumber-rooms inhabited

by spiders, and the majority of their owners have given up aquarian pursuits, under an impression that the construction of water-tight tanks is an impossibility, whereas the Warrington tank, having three sides of slate, can be made sufficiently strong to endure a lifetime. The amateur who constructs his own vessel must be on his guard against the folly of attempting to make it light: the heavier the better, consistent with neatness and soundness of the joints.

A still more important advantage of the slope-back tank is the equable temperature of the water within it. Even if the sun's rays be allowed to play on the back of the vessel—which they should not—there is so large a bulk of slate for them to heat before the water can be affected, that there are no sudden changes of temperature to destroy the lives of the inmates. Vessels of this sort are therefore essentially *cool*, and during the trying months of July and August marine animals will endure the heat with patience, when, in any vessel having glass sides, they would perish rapidly.

The improvements effected by Mr. Lloyd have rendered this form of vessel still more acceptable than it was originally. On the principle that the larger the bulk of water the greater the variety of creatures that may be preserved in it, a form was adopted by which the triangular space under the sloping back is converted into a water chamber, communicating with the space in front. Into this chamber none of the animals can find access, and in one sense the bulk of water it contains may be regarded as a reserve, the whole of which can be pumped into the tank proper whenever, by the death of an animal or other causes, the water there has become impure. A further advantage of the water chamber, in addition to the increased resistance to changes of temperature which the increased bulk of water offers, is the rapid restoration to purity which the water undergoes in it, and the obliteration in the course of a few hours of that peculiar malady of the marine tank, known as "pea-soup greenness," the result, generally, of the too free admission of solar light. Should the tank become cloudy by the presence of an excess of microscopic sporules, the whole can be changed from the light to the dark chamber, and *vice versa* by the action of a small pump; and thus, in case of any accident, there is a reserve of fresh sea-water ready, without fetching or carrying, in the body of the tank itself. Being comparatively shallow as to other dimensions, there is a large surface exposed to the action of the atmosphere; and by adding a glass cover, to be raised or lowered by means of a cord and pulley, all the conditions of success are insured by the simplest possible arrangements.

For special purposes other forms of tanks must be used. It is not advisable, for instance, to associate together crustaceans and anemones, and instead of the slope-back tank, which is unequalled for the latter, the former are most conveniently preserved in shallow octagon tanks, which are fitted with rock-work rising above the surface of the water, so as to allow the creatures to leave the water entirely, and scramble about on the rocks above the surface.



Octagon Tank for Crustaceans.

If a cover be needed to prevent escape, one of wire gauze, fitted on a moveable frame-work, would be the best. If a glass cover is used, it should be in two or more pieces, placed sufficiently far apart to admit air, and raised above the level of the edge of the tank at least a quarter of an inch, so that the air may circulate underneath it.

In the furnishing of aquaria, whether for marine or fresh-water life, the simplest arrangements usually prove the best; and it is advisable to avoid the use of cement, if, by any possibility, the intended design can be carried into effect without it. Blocks of water-worn stone and old serpulæ and oyster shells can be easily worked up into picturesque rockeries without the aid of cement; and it is equally easy to provide places of concealment for creatures that love to hide, by merely lodging a flat stone or large shell in such a position as

will allow the creatures to enjoy the shelter and still remain within view. If, however, cement must be used, let it be the best Portland, mixed with two or three times its bulk of sand. As it hardens quickly but a small quantity should be mixed at one time. It is a bad plan to construct an elaborate rockery in a tank, for we do not know how soon we may wish it away, and find that in this particular case it is less easy to destroy than to construct. It is better to construct the affair in separate blocks, which will fit together in the tank without being made fixtures. Empty flower-pots form good centres for blocks of rock-work, affording strength and a firm base without weight. Common coke washed with cement to alter its colour is an excellent material for small rockeries, being extremely light and manageable. All cemented work should be steeped in fresh water in the open air for at least a fortnight before being consigned to its final place in the aquarium.

CHAPTER III.

A HISTORY OF A MARINE AQUARIUM.

He turned—there was a whelming sound—he stept,
There was a cooler light; and so he kept
Towards it by a sandy path, and lo!
More suddenly than doth a moment go,
The visions of the earth were gone and fled—
He saw the giant sea above his head.

KEATS.

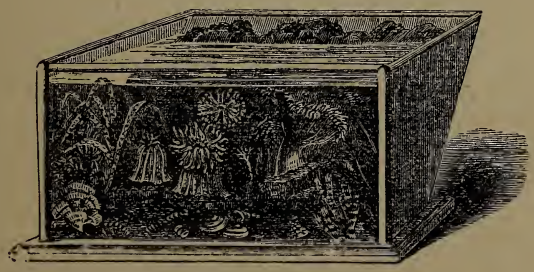
HE passage quoted above from the conclusion of the second book of Keats' "Endymion" may be considered in some sort prophetic of the grand aquarium which formed a feature of the International Exhibition at Paris, in 1866. The visitor was permitted to share the experiences of Endymion to the extent of having "the giant sea above his head," for the vessels were constructed with glass bottoms, and so placed that their contents were seen from beneath. The thousands who can find delight in sham stalactites were well amused with this aquarium; and as a "show" it was no doubt a success. In every other sense, however, it was the greatest amongst the many failures which would have to be recounted were it our business to write the history of the aquarium from its first beginning. There were at least two reasons why this project should fail; first, that to view marine animals from below is to see their least

attractive and least interesting features—it is like attempting to discover the beauty of Apollo by a glance at the soles of his feet. But the constant accumulation of *débris* affords the best argument against this method, and in this particular instance the result was that the bottom of the vessel soon became opaque, and so continued to the end. It is of the utmost importance to guard against extravagances in the construction and management of aquaria: almost invariably, from first to last, simplicity will be favourable to success.

When engaged in the experiments which were the foundation of my first written essays on the aquarium, fifteen years ago, and subsequently of the "Book of the Aquarium," and some scattered papers in periodicals, the grand difficulty was to determine an exact and self-sustaining balance between the various forces and influences that an aquarium brings into play. Every failure then occurring was the result of attempting too much. It is impossible to forget the waste of time, and strength, and money in attempts to domesticate the larger forms of marine algæ; and how those hopes only faded out when years of watchfulness and wasted energy made it but too evident that it was easier to dream than to do. Small quantities of sea water enclosed in vessels in dwelling-houses are too peculiarly circumstanced to be made representative of Neptune's watery kingdom, but they may be made representative of rock-pools and recesses. We may treat them as spoonfuls of water, and achieve such success as spoonfuls admit of; but we must not suppose we have the sea at our command, and a choice for our amusement of all its vegetable and animal denizens.

Deep tanks are deep delusions. If it were possible to be content with a mere film of water over the animals they would, as a rule, prosper better than in depth enough to be completely submerged. The grand object is to present to the influence of the atmosphere the greatest possible extent of surface, and in shallow tanks this is of course accomplished. The slope-back tank is a heavy and rather cumbrous vehicle, and FOR THAT REASON it surpasses every other form where it is not possible to establish a tidal arrangement. The great mass of slate is not quickly influenced by changes of temperature, and the slope affords a great extent of rocky bottom for a picturesque disposition of the interior, and for the full growth of oxygen-making vegetation. This form also allows of the transmission of light in a subdued form, and an excess of light is impossible. Lastly, if the creatures confined in the vessel are of a roving habit, this propensity is encouraged, and wherever they roam they still remain visible.

For the purpose of determining a few elementary points of management, I fitted up a Warrington slope-back tank in my study. It was placed with its back to the window, and at about fifteen inches from the glass, so as to receive but a moderate amount of daylight, and that wholly through the green glass cover; light from the front being impossible. This tank is made wholly of slate, except the front, which is plate glass, and the back is placed at an angle of 40°, which leaves a hollow cavity at the back; there is therefore no water chamber. The capacity of the tank is twenty gallons. Previous to fitting this tank I had by me a considerable quantity of *débris* from former



Slope-back Tank.

experiments, and I set out in the full sun a large collection of old shells of oysters, whelks, serpulæ, and other odd gatherings that had lost their interest because their inmates had perished. Conspicuous amongst these were some pieces of tile and rock thickly coated with acorn barnacles. Fearing there might be some gelatinous matter, the result of deposition when the animals perished, I placed them in a vessel of water for a few days to dissolve out any organic detritus, and then placed them in the sun to be thoroughly sweetened. These several materials were used for covering the sloping slate back of the tank, and their adoption was a most decided gain; in fact, they soon told me that heavy blocks of mica-schist or *any other rock* were wholly unnecessary. These slate tanks are very heavy, and it is not desirable, unless a house is built expressly to receive them, to increase the weight by piling up rockwork inside them. In my case any serious addition to the combined weight of tank and water might cause the whole affair to subside from the study at the top of the house to the bed-room immediately below it, which would be an

unpleasant circumstance, especially if it happened at night. But the bank of rocks at the back of the tank may be said to weigh nothing at all, consisting as it does wholly of old shells, and some of them very large, handsome, finely perforated and richly clothed shells of oysters from which the inmates departed many a year before. I found the shells weather-beaten on the beach. Please make a note of this therefore, and if you are fitting up an aquarium, secure for it a few hampers of sea-side findings of an ancient shelly kind, and let the chief bulk consist of the largest and most ancient of the beach-strewn oyster shells that can be obtained. They are worth all the cost of carriage and more to an enthusiast in those matters, as will be seen presently.

The tank was fitted with these substitutes for rock, and filled with sea water. I put in about half-a-dozen tufts of Ulva and Enteromorpha, and after four days had elapsed I stocked it with animal life as follows:—Six *Actinia mesembryanthemum*, two *Sagartia viduata* (anguicoma,) four *Sagartia bellis*, four *Bunodes gemmacea*, two *Actinoloba dianthus*, one fine block of *Corynactis viridis*, and twelve periwinkles. I left all alone for a week, and at the end of that period most of the zoophytes had shrunk up, refusing any longer to display their gorgeous rays of flowery tentacles, and a black spot in one corner told of a death that had occurred. I soon found that the defunct party was a periwinkle, and he was removed. Three or four days afterwards a slimy appearance and a slight cloud indicated another death, and this time it was one of the *Bunodes gemmacea*. The next day I lost a *mesembryanthemum*.

When the last corpse was removed, a cloud rose from the spot where it had lain—the thermometer in the room being then at 83°, and the water was in a bad state. I was compelled, therefore, to remove the animals to a shallow pan, and leave them uncovered for a time, while I filtered enough water through charcoal to enable me to cover them with a thin film. The remainder of the water was exposed in a vessel to the sunshine for three days, and the empty tank was well cleansed and dried, and the shells exposed to sunshine to effect a perfect purification. While in the shallow pan I lost my block of *Corynactis* —every one perished. The tank was refitted, but the water was by no means so bright as when it was dipped from the salt sea. I made good what had been lost by evaporation by adding fresh water till the specific gravity bulb showed an inclination to sink. The same day a fine *dianthus* floated about instead of adhering; all the rest adhered well, and there was a fine display of tentacles, as is commonly the case after the animals have been disturbed. I removed the *dianthus*, and gave him a vessel to himself; but he never took

hold, and died without a murmur. In the course of the summer I lost two more periwinkles; but though they lay some time decomposing before I knew it, I did not disturb the water, being content to remove them quietly, and leave the water and its inmates to fight it out.

For three years this tank had no attention beyond occasional replenishing with fresh water to make good losses by evaporation, and very careful feeding of the animals. Then, considering the experiment satisfactory and sufficiently lengthened out, I distributed the little collection. At the time of distribution the stock consisted of five *A. mesembryanthemum*, two *S. viduata*, one *S. dianthus*, four *S. bellis*, three *B. gemmacea*, and eight periwinkles. The state of the tank was also very different to what it was for some months after the first furnishing. During the first winter all the tufts of Ulva and Enteromorpha perished. I thought then, and I still think, that in winter such a tank ought to be turned round to face the light, and be turned back to its former position some time at the end of February or the beginning of March. I wish I had done so, it would have made the experiment more complete probably. However, I did not; the fact is, such things are not easily moved, and so, if it occurs to one's mind to move them, the intention is scarcely likely to be carried into effect. Before the first winter set in, there was a preceptible green growth on some of the shells and stones, but it was not until twelve months had elapsed that spontaneous vegetation appeared in any quantity. Then I became aware of the immense value of the old shells; for the rough, much-pierced, and sponge-covered oyster shells acquired a rich deep green hue, and equally well clothed were the shells of the barnacles. On these latter, indeed, vegetation *first appeared*, and they are, no doubt, invaluable, if well cleansed of animal matter before being inserted. But from first to last there never occurred a single instance of "pea-soupiness," no ropy confervæ were produced. The vegetation amounted to no more than a velvet-like, deep green coating on shells and stones, and this always richest on barnacles and oyster shells.

In every case of death subsequent to those particularized above, I have allowed the water to right itself, which it does in the course of a few days, or a week, the cloud spreading at first all over the tank, and then contracting to a black spot, which marks where the animal perished, and in the course of a fortnight (or less) this entirely disappears. It is an important fact that when the animals become seasoned, and the whole affair is left alone, one death does not necessarily lead to another, as in a tank heavily stocked, and exposed to a strong light; but as soon as the cloud caused by decomposition begins to spread,

all the creatures close their disks, the mollusks contract and draw down their operculi, and in this state of torpor they all remain till things improve, when they again resume their activities. The most frequent cause of impurity is the result of feeding; for scraps of oyster or mussel given them are sometimes immediately ejected, and fall among the shells, and remain hidden, to cause putrefaction. The only means of preventing this is to remove every particle of food not received by the animals; to feed seldom, so as to increase the probability that food will be welcome; and, lastly, to feed only on bright mornings, when the water is nearly transparent. Once a week is often enough to feed all the summer, and once in two or three weeks during winter.

During the first few months after the tank was fitted it had much attention, and was kept to a regular standard of density. By degrees I slackened in my attentions, and this did not result in disaster. Once, after long absence from home, and much absolute neglect of the tank, I observed that the water had sunk to a low level, and I inserted a hydrometer. What was my horror to find it register a specific gravity of 1,416! Yet even then the *mesembryanthemums* appeared as lively as usual, and *dianthus* was slowly imbibing and contracting, puffing itself out to enormous dimensions, and then becoming constricted, as if tied with a cord, as is the wont of this lovely conjuror of the deep. I found after a time that instead of adding fresh water by slow degrees, as I did at first, I might add sufficient at once to reduce the specific gravity to 1,028 without any harm to the inmates. They would, perhaps, close for a few minutes, and then shine out with greater splendour than before. In every case when the water acquired an unnatural degree of density, the periwinkles attached themselves firmly, shrunk down deep into their shells, and drew their shutters down as tight as possible, and so remained till things came right again, when they would make up for lost time by increased activity and voracity. Since then the tank has frequently lost as much as two inches depth of water by evaporation, and I once found the specific gravity to be 1,529! Yet nothing worse happened than a general torpor and constriction, and a few hours after the reduction of the density to a proper standard, the creatures were all as lively as ever.

Having referred to cloudiness caused by deaths, it is right I should say that, with the exception of those few occurrences, this experimental tank was always delightfully bright, and there never occurred any growth on the front glass. When unstocked the water had the same bright appearance as when it was first dipped in the English Channel; but there were floating on the surface

some small patches of brown flocculent matter, a sort of scum which I thought resulted from a gradual accumulation of a linty sort of dust, the result of the tank being amongst books, and which had crept in by the small slit of the sixteenth of an inch which intervenes between the edge of the glass cover and the side of the tank at each end. The water was always rich in microscopic life, and its capacity for sustaining a mixed collection of marine animals appears to be in the proportion of not more than one to a gallon. For so large a creature as a *dianthus* I should think two gallons none too much, with a shallow vessel, and vegetation produced *in situ* as essential elements of success; whereas with similar advantages two or three smaller anemones, might be kept in a gallon of water. Even a periwinkle needs nearly a gallon of water, spread out over a considerable surface, to keep it alive two or three years. But by adopting this liberal rule, we make an end of the necessity for aërating, and for frequently renewing the stock of plants and animals.

This history of one particular tank is intended to convey a clearer idea of the principles on the observance of which success depends than might be possible as the result of a methodical essay. The reader will have observed that the amount of light which reached the vessel was inconsiderable, as compared with the full glare of light in which aquariums are usually placed. I might almost venture to say, that, as a rule, if the lighting of the vessel is well managed, success is certain. At all events *that* is the matter of primary importance, for not only do the marine animals, ground stock especially, shun exposure to a strong light when disposed to activity, but a subdued light is equally desirable for the development of the proper kind of vegetation—the direct accession of solar rays tending always to the growth of the coarser kinds of algæ, which result in the production of ropy masses of obnoxious confervoids and occasional outbreaks of pea-soupiness. A large show-tank, which has been in use many years, and has never been out of order for more than a day or so at a time, occupies a position next a wall, *opposite* the windows; that is to say, it does not occupy a window at all, and the light has to traverse the whole breadth of the apartment before reaching it. This tank is formed wholly of glass, but the back is covered with light green paper, cemented on by means of copal varnish. This green background enhances the beauty of the scene, especially as affording a reflection of light through the arches of the rock-work: it is also a means of harmonizing the whole of the details, and it causes the tank to appear of far larger dimensions than it has—an agreeable delusion.

O thou vast ocean! ever-sounding sea!
Thou symbol of a drear immensity!
Thou thing that windest round the solid world
Like a huge animal, which, downward hurled
From the black clouds, lies weltering and alone,
Lashing and writhing till its strength be gone.
Thy voice is like the thunder, and thy sleep
Is like a giant's slumber, loud and deep.
Thou speakest in the east and in the west
At once, and on thy heavily-laden breast
Fleets come and go, and shapes that have no life
Or motion, yet are moved and meet in strife.

BARRY CORNWALL.

CHAPTER IV.

THE FORMATION AND MANAGEMENT OF A MARINE AQUARIUM.

"Here too were living flowers,
Which like a bud comparted,
Their purple lips contracted;
And now in open blossom spread,
Stretched like green anthers many a seeking head.
And arborets of jointed stone were there,
And plants of fibres fine as silk-worms' thread,
Yea, beautiful as mermaid's golden hair,
Upon the waves dispread."

SOUTHEY.

THE beauty of a richly-stored and well-kept aquarium is sufficient to recommend it to one who would have a "home of taste." But perhaps it will be best enjoyed, because best understood, by one who has collected its materials in sea-side rambles and dredging expeditions, and who regards it as an aid to study much more than an adornment of the house. Our business is to consider it rather as a recreation and an ornament than as a depository of scientific truth, and therefore we shall not attempt any systematic description of the forms of life it presents to our notice as a microcosm of the all-embracing sea. It must be borne in mind, that, whatever may be the primary object of the possession of an aquarium, judicious management is a matter of the first importance. The scene, however beautiful at first, will soon change, unless every needful precaution is observed from first to last, and so if we turn from the scientific aspects of the subject,

we must not cease to comply with those requirements in matters of management, which the scientific aquarian finds essential to success. Many of these requirements have been explained already; and indeed for a first fair launch in practice the reader has sufficient information in the preceding chapters; yet it seems that we may make a few more observations with advantage, in order to gather up a few generalities connected with the actual work of forming and keeping a marine collection.

The pleasant way to form a collection is to turn collector; to haunt the shore and skim the surface, and drag the bottom of the sea; with such nets, dredges, jars, and baskets as suit the scene, the season, and the collector's turn of mind. This is a pastime for all seasons, but of course is most practised in autumn, for then the seaside becomes the home of thousands who at other times are far removed, and it may be, in their town residences, as much estranged from ruralities as from the less familiar scenery of wave-washed cliffs and sandy beach. The best seasons for collecting are summer and autumn, so our social customs do not jar with this pursuit.

It will be a very poor coast indeed that will give nothing suitable for the aquarium. Amongst unfrequented rocky inlets where many tide-pools are formed will be found the richest harvest. The bleak and bare reaches of sand or mud that connect low-lying coasts with the sea are usually comparatively barren, but rocks are fruitful, and even sand and mud are never utterly barren. It is well to know what to collect, or at all events what to keep. We may pick up all sorts of things for amusement, and be instructed by our observations of their character, but it is not every product of the sea that may be obtained in this way that is adapted for the aquarium. For example—the example being an unwelcome one—scarcely any sea-weeds, of whatever kind or colour, will live for any length of time in a tank. My own rule of action is to exclude from the tank every scrap of vegetation except such as is actually produced in the vessel itself—its own spontaneous growth. But at the first start, and in forming temporary collections, whether to be abandoned when the season is over, or to form the nuclei of permanent collections, a few of the small-growing green weeds will be useful. Two at least may be specified as the best of their class, namely, the sea lettuce, *Ulva latissima*, and *Enteromorpha compressa*. The first is a riband-like plant, the second grass-like; both of them are of a rich light green colour. These must be obtained on small blocks of stone or on old oyster shells: if torn from their footholds they are sure to perish.

Probably the very first animal that will be captured will be the common Beadlet, *Actinia mesembryanthemum*, which is almost everywhere abundant, and seeks no concealment, being exposed for hours together between tide-marks when the tide is out. This anemone bears confinement with complacency, and is therefore most valuable. Moreover the species varies so much that the several varieties constitute in themselves a pleasing collection, affording rich tints of brown, red, green, olive, and buff. The Beadlet may be considered the pioneer, both for its fellows of the sea who are to follow it to the tank, and for the happy possessor, who by observation of its habits will learn how to deal with other anemones that are less hardy. Therefore this very "common" creature must never be despised, and it will afford a pretty pursuit to search for the varieties, and a study calculated to lead to a broad perception of the teachings of the aquarium, to determine their specific identity with the type. A shallow vessel, such as a glass milk dish or the lower part of a glass fern shade, with two or three tufts of enteromorpha and half-a-dozen Beadlets may be considered a good aquarium for a beginner.

In capturing anemones some tact and judgment must be used. The safest way always is to chip off by means of hammer and chisel a block of the stone on which they are seated. This is sometimes an easy task, oftentimes difficult, sometimes impossible. Certain of the more delicate-habited species are pretty sure to die if forcibly removed from their holdings, but these we need not enumerate. It is sufficient to say that by far the larger proportion of all that are ordinarily met with may be detached by carefully working beneath them with the thumb nail, and provided the base of the animal is not injured they will rarely be the worse for it. The blunt end of a large pewter spoon may be used as a persuader to remove anemones with good effect; but the greatest care must be taken; there must be no hurry, the shrinking pulpy creature must not be torn; and although, perhaps, as to sensation they occupy a very low place, we will say they should not be tortured; and it is wanton waste of time to tear them off rudely, for that is simply to kill them.

More abundant than anemones on some coasts are such mollusks as the top, the winkle, and the limpet. These should never be collected in any great quantity, for they are likely to die, and their rapid and offensive putrescence may kill all else in the tank with them. I have kept winkles and tops in a tank for years, but it needs experience to determine the best mode of procedure: attention they really do not need, if the affair is made right in the first

instance. If you can afford to appropriate a tank expressly to them you may hope for success. Then fit up a bank of old serpula shells, oyster shells, and bits of mica schist over a bed of clean pebbles, have no weeds at all, place the tank *opposite* a window, so that the only light that reaches it is that which has passed across the room, and with much water and few mollusks all will go well. The spontaneous growth will suffice for their maintenance, and you may find much entertainment in watching their movements. The mode of feeding of these creatures is a most interesting study: the tongue of the winkle is a marvellous construction.

Shore crabs are abundant on sandy and shingly coasts, and easily captured. In rock-pools Soldier crabs, and in deeper water Hermit crabs abound. These are grand acquisitions where a tank can be appropriated to them, but they do not group well with anemones, except under skilful management. But their near allies, shrimps and prawns, are well suited for a mixed collection, and you will easily obtain them, if not by actual capture, by means of a small fee to a shrimper. Their weird outlines and ghost-like movements add very markedly to the attractions of the aquarium, for whatever moves in the miniature sea is fascinating and sustains its interest.

Star-fishes are rarely captured by the sea-side wanderer. We must go out and dip for them, and when we obtain them we may reasonably fear that they will rather die than live. So too of fishes, yet a few blennies and stickle-backs captured in a rock-pool will be well worth keeping, if a large bulk of water can be afforded them, their pretty gambols and occasional mischievous freaks will furnish dramatic scenes for general entertainment, and arrest the attention of the least studious members of the household.

After all, sea anemones are most to be desired, and the choice afforded even to the merest tyro is a large one. The hardy Beadlet, already referred to, the pretty gem, (*Bunodes gemmacea*,) the daisy, (*Sagartia bellis*,) the cave anemone, (*Sagartia troglodytes*,) and the great plumose anemone, (*Actinoloba dianthus*,) afford examples of species unsurpassed by all the rest in beauty, yet all so hardy, that they need but little skill to keep them in health and vigour for years. In truth, useful as are many of the smaller kinds for the sake of variety, and because, if we love these things at all, we hunger for as many as can be got, Dianthus is the grandest of the group, and a marine aquarium of any pretensions is incomplete without it.

In the conveyance of sea-side gatherings there must be as much care taken as in obtaining them. Such things as baskets, bottles, and jars, will naturally

suggest themselves as useful. As a matter of course also, there will be need for sea-water (artificial sea-water is never to be thought of if the real article is obtainable) for the use of the creatures captured. But it is well to bear in mind, that with the exception of fishes, which must be conveyed in water, almost everything else will travel more safely packed in wet sea-weed, more especially as when so treated they are not liable to injury by being shaken about as when immersed in a body of fluid that must be more or less agitated. Anemones will live for several days in a mass of wet sea-weed; shore crabs and shrimps will hold their own for several hours under the same conditions. There need be but little conveyance in water, and when that plan is adopted, it is advisable to employ a sufficient number of vessels to avoid over-crowding, and also to allow of some kind of classification to prevent warfare and its accompanying destruction. One precaution must always be taken, namely, to pack the stock in such a way as to lessen to the utmost the probability of jarring and attrition; a rough piece of rock, for instance, may chafe a few anemones into a lifeless paste in a very short time if in contact with them, and subjected to the jolting of a fast train.

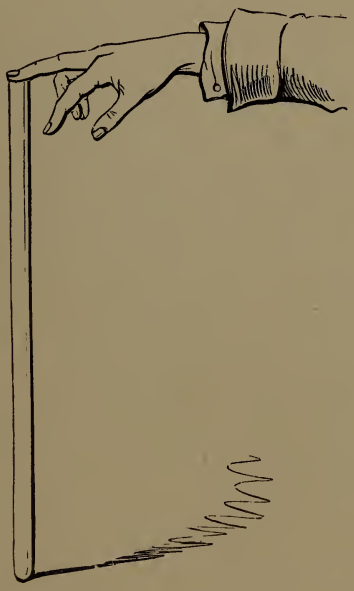
In the stocking of a tank, the first essential is to avoid over-crowding. It is important also to keep in separate vessels animals that are likely to make war upon their neighbours. Little fishes, for example, have but small chance of their lives in a collection of anemones: they may at any moment be caught by the tentacles and tucked into the appropriating cavity, without having time to fight for it or even sigh for deliverance.

To keep the water bright and always at the same standard of density are easy tasks, needing regular attention more than peculiar skill; the deeper the vessel the more difficult will it be to maintain in the fluid a sufficiency of oxygen. My own idea of a well-managed tank is, that with the exception of feeding the animals and a little occasional cleansing, one that manages itself—one for example that never needs artificial aëration. The removal of the dead is of course to be accomplished as soon after a death occurs as the fact becomes known. But there may be observed a general languor of the inmates; this will indicate insufficiency of oxygen. The remedy for this is aëration. A simple though tedious way of impregnating the water with atmospheric air, is to dip with a jug and pour back from as great a height as possible without injury to the surrounding furniture by splashing. This should be continued as long as possible, and should be frequently repeated. Another method is to employ a garden syringe or a common squirt, the instrument

should be filled and the water ejected into the tank with force, taking care that it passes through some space before reaching the surface, in order to ensure the entanglement of air with the water ejected; this also is a tedious work and must be continued for a long time and be frequently repeated. There is yet a third mode, a self-acting system, which may be kept at work day and night, and generally speaking it answers well. Procure any kind of vessel of glass or porcelain that can be adapted to the purpose, and that will not by its unsightliness make the aquarium ridiculous. It may be possible to place it out of sight above the tank in a position where it can be conveniently got at as required. The vessel must hold a body of water—say a pint, a quart, a gallon, according to the size of the aquarium. It must also discharge the water into the vessel below it, in a succession of drops or in a fine stream—thus carrying with it constantly a certain amount of atmospheric air. A jar fitted with a bung in which a small hole has been pierced will be found the simplest and most easily obtained form of dropping aërater. It scarcely need be said it must be suspended mouth downwards. Better than that is a bell-glass of the kind made for bee-hives, the top being perforated for ventilation. Into the ventilating hole fit a cork that will allow the water to pass in drops. Suspend it by a cord passing over a pulley. Fill it at the surface, and draw it up; when empty fill again, and so on for ever.

The feeding of the animals must not be neglected. The best food is the fresh flesh of a mussel or oyster cut very small. Lacking such pabulum, minute morsels of raw mutton or beef may be employed, but no vegetable substance is admissible. For example, a few crumbs of bread may be considered poison to a marine aquarium, though in a river tank such food is always acceptable in moderation. It will not do to drop in bits of meat, whether of oyster or mutton, indiscriminately. The little morsels must be guided to the mouths that are to eat them. The always hungry opelet, *Anthea cereus*, will almost always eat all it can get, and help itself to a little fish occasionally as well. Many of the smaller kinds will never take a scrap of food when it is offered, but will close their flowery tentacles as the meat reaches them, and there it will lie untouched for hours, perhaps will never be taken at all. It is of the utmost importance to study the art of feeding, for every scrap of food is a possible element of mischief, its rapid decomposition may render the water turbid and poisonous, and cause the death of every creature in the tank. If you are not already tired of directions, please pay attention to what follows. Anemones are not naturally accustomed to butchers' meat, and hence they are

apt to deal with it differently to food they are born to. A limpet may be sucked in alive, all its soluble parts may be appropriated, and the shell at last cast out as "rubbish to the void." The anemone has but one orifice. It takes food and absorbs from it all the nourishment it contains, and casts up what remains. Observe the consequences, when you give them morsels of meat they may or may not take them in; but if they do, they cast them up again. Now do not, when you see the little mites of white meat lying upon their



Dipping tube.

tentacles, or on the pebbles beside them, hastily conclude they have not been accepted, for the probability is that they have been swallowed and digested, and are but the gastric ghosts of what they were. However, the lesson of the case is that these unsightly bits must be removed, and there is a very simple way of accomplishing it by the use of the dipping tube. This is a glass tube half an inch in diameter, open at both ends, employed in dipping as represented

in the figure. Lower it carefully with the finger applied until it is exactly over the object to be removed. Then lift up the finger, and the water will rush in, carrying with it the fragment. Apply the finger again and lift it out, and you have accomplished your object.

Remark was made above on the necessity of maintaining the density at its proper standard. Rain-water has a specific gravity of 1,000; sea-water is heavier, its specific gravity is 1,028. As there is always more or less evaporation going on, the water becomes more and more saline, and consequently attains a higher specific gravity, unless fresh-water is added as the need for it occurs. A specific gravity bulb, graduated for the purpose, should be kept floating in the tank, and in adding fresh-water to make good the loss by evaporation, enough should be supplied to cause the bulb to descend an inch or so below the level, and at that point, or nearly, it should always be kept. A well-doing tank in which the animals are fairly proportioned and thoroughly seasoned, will not suffer by a little neglect of this matter, for if the water attains a density of 1,100, the anemones and mollusks will simply close and become dormant. But of course it is better to do things well, for the aquarium is not only designed to keep the creatures, but also to display them, and any departure from the best conditions possible will be attended with a suspension of the exhibition, for discomfort will cause the animals to sulk and retire out of view.

In the case of an emergency, artificial sea-water may prove of immense value, but it is never to be used when real sea-water is obtainable. The following is a formula for preparing it:—Take 14 oz. (avoir.) of common table salt; 1 oz. (avoir.) Epsom salts; 800 gr. (troy) chloride of magnesium; 160 gr. (troy) chloride of potassium; mix with spring-water, and adding it a small quantity at a time until the hydrometer registers 1,028,—a few degrees higher will be better than a few degrees lower, as it is easy to dilute further in the course of a day or two. In this mixture place, if possible, a few tufts of sea-weed, and any other *fresh* sea gatherings. These will communicate to the fluid a trace of iodine, and will promote the complete blending of the ingredients. Remove the sea-weed and other such materials in a day or two, then pass the fluid through a filter, and it will be ready for use. If artificial sea-water should be needed at the shortest space of time possible, make a very small quantity, sufficient to cover the animals with a mere film, and place them in it at once: this plan will afford time for preparing a larger quantity properly.

LIST OF SEA ANEMONES

ADAPTED FOR CONFINEMENT IN AN AQUARIUM.

The names which follow are those adopted by Mr. Gosse in his "History of the British Sea Anemones," a work which every student of the aquarium should possess. The figures in the coloured plate are practically studies from the same admirable work. The most desirable species for beginners are marked with an asterisk.

Actinoloba dianthus,* the Plumose Anemone; *Sagartia bellis*,* the Daisy Anemone; *Sagartia miniata*, the Scarlet-fringed Anemone; *Sagartia rosea*, the Rosy Anemone; *Sagartia venusta*, the Orange-disked Anemone; *Sagartia nivea*, the Snowy Anemone; *Sagartia sphyrodeta*,* the Sandalled Anemone; *Sagartia troglodytes*,* the Cave-dwelling Anemone; *Sagartia viduata*,* the Snake-locked Anemone; *Sagartia parasitica*, the Parasitic Anemone; *Aiptasia Couchii*, the Trumplet; *Anthea cereus*,* the Opelet; *Actinia mesembryanthemum*,* the Beadlet; *Bunodes gemmacea*,* the Gem Pimplet; *Bunodes coronata*,* the Diadem Pimplet; *Tealia crassicornis*, Dahlia Wartlet; *Peachia hastata*, the Arrow Muzzlet; *Edwardsia carnea*,* the Crimson Pufflet; *Cerianthus Lloydii*,* the Vestlet; *Aureliania heterocera*, the Yellow Imperial; *Corynactis viridis*, the Globe-horn; *Zoanthus Couchii*, the Sandy Creeplet; *Zoanthus sulcatus*, the Furrowed Creeplet; *Caryophyllia Smithii*,* the Devonshire Cup-Coral; *Balanophyllia regia*, Scarlet and Gold-star Coral.

The Coloured Plate contains figures of fifteen species of anemones and corals. In the foreground rises the tall column of the Plumose Anemone, richly fringed at the summit; below it to the extreme left of the picture the Rosy Anemone, recognizable by its colour. The semi-prostrate object in the foreground is the Arrow Muzzlet; immediately behind it, presenting a depressed starry disk upon an ochreous-tinted column, is the Sandalled Anemone. The red-weed waving above the Sandalled Anemone is *Dellesseria sanguinea;* the large spotted anemone and the small green one, both to the right of the weed, are examples of the Beadlet. The little orange-tinted gem, immediately above the Beadlet is the Scarlet and Gold-Star Coral, to the left of which, posed horizontally, occurs the Devonshire Cup-coral. On the extreme right at the

summit is a tuft of a pretty red-weed called *Phyllophora rubens*, to the left of it another example of the Rosy Anemone, and further to the left the Diadem Pimplet. Continuing to explore the extreme summit of the rock, we next meet with the elegant little Globe-horn, with green stem and far-spread disk, and to the left of this the Orange-disked Anemone. The grass-like weed which occupies the left-hand corner, is *Griffithsia setacea*. The bold-featured specimen with green tentacles, a little to the left of the centre of the picture is the Opelet; the one showing a full face a little to the right above it is the Cave-dwelling Anemone, and the smaller one a little to the left below the Opelet is another specimen of the Sandalled Anemone. Between the Griffithsia and the Opelet is shown another specimen of the Beadlet, of a fine deep purplish red colour.

He prayeth well that loveth well
All things, both great and small;
For the dear God that loveth us
Made them, and loveth all.

COLERIDGE.

AQUARIUM.

THE FRESH-WATER AQUARIUM.

THE mosses of thy fountain still are sprinkled,
With thine Elysian water-drops: the face
Of thy cave-guarded spring, with years unwrinkled,
Reflects the meek-eyed genius of the place,
Whose green, wild margin now no more erase
Art's works; nor must the delicate waters sleep,
Prison'd in marble, bubbling from the base
Of the cleft statue, with a gentle leap
The rill runs o'er, and round fern, flowers, and ivy creep.

BYRON.

CHAPTER I.

CONSTRUCTION AND MANAGEMENT OF RIVER TANKS.

RIVER tanks are far inferior to marine tanks in scientific interest, but they make ample amends for their failing in that respect. As embellishments they must have the first place, because of their freshness and beauty when skilfully managed, and the accessibility of materials for furnishing them, and the comparatively small amount of skill required to bring them to perfection.

The marine aquarium may be likened to a museum and the fresh-water aquarium to a panorama. The first will attract the student and afford a study for a lifetime to a few. The second is well adapted for the delight of thousands; the liveliness of its inmates and our own familiarity with them, whether they be

"Weird inhabitants of lonesome pools,"

or, as is much more likely and desirable,

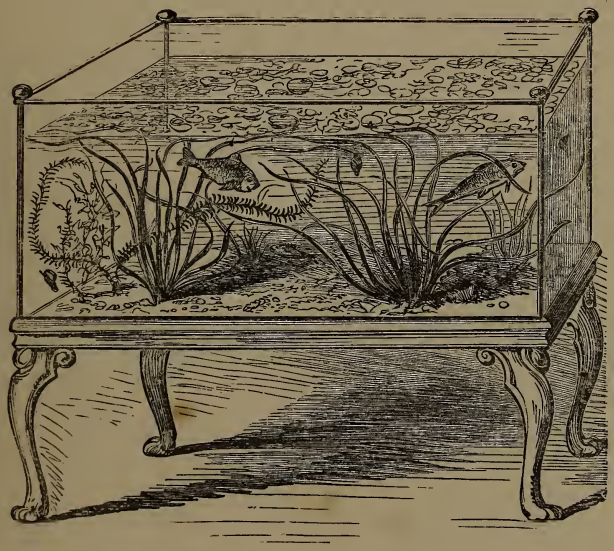
"Fairy fishes from the mountain tarn,"

we cannot but be amused by their gambols, and we may find in their recognition of our attentions, the basis of an intimacy resembling friendship. Here are the finny favourites of our rills and lakes, the mosses of our own moors, the ferns that we have wandered miles to see waving under their native waterfalls; the traditional glories of our own old English water scenes—the lilies, the arrow-heads, and, if you will, the bonny flowering rushes, over which, in the green old time, the bride walked in fragrance to the altar.

Each rising charm the bounteous stream bestows,
The grass that thickens, and the flower that blows.
And while the vale the humid wealth imbibes,
The fostering wave sustains the finny tribes;
The carp, with golden scales, in wanton play;
The trout in crimson-speckled glory gay;
The red-finned roach, the silver-coated eel;
The pike, whose haunt the twisted roots conceal;
The healing tench, the gudgeon, perch, and bream;
And all the sportive natives of the stream.

Although much that has been said as to the construction and management of marine aquaria applies to the subject before us, nevertheless, the river tank needs somewhat different treatment, and we must consider its several requirements in detail. It may be remarked in the first place, that we have here ample scope for the exercise of taste and ingenuity, almost any kind of vessel may be employed, and there is no great difficulty in associating with the fishes many forms of both fluviatile and terrestrial vegetation, as, for example, ferns and mosses, as well as vallisneria and anacharis. To consider the case in the first instance in the most elementary manner, we may safely discard the heavy slope-back tanks of slate recommended for marine animals, for a lighter

vessel more freely illuminated. A good form for a river tank is suggested by the engraving, which represents a tank of my own, the position of which is *opposite* a window, between the bookshelves in my study.



River Tank, containing Gold Carp, Roach, and Minnow; Vallisneria spiralis, Anacharis alsinastrum, and Floating Frog-bit.

To keep any of the higher kinds of fresh-water vegetation in health the tank must be placed in a window, which, in respect to all the rest of its contents, is the very worst place for it. By the way, it is fortunate that aquaria should be kept away from windows, for those who have a taste for such things are constantly tempted to block up all their windows with tanks and fern-cases, to the injury of their health by the loss of light and air which should have free access to every apartment. Provided the tank is well made and placed upon a stand well able to bear it, the form is not of much consequence, but a plain rectangular figure is for all general purposes to be preferred,

because, in a case like this, the form of the vessel should be subordinated to its use, and we want the best view possible of its contents.

In the "Book of the Aquarium" I have endeavoured to expound the "natural system" of tank management, which, as its name implies, is the only system by which satisfactory results of a permanent nature are to be obtained. The history of aquaria in the most extensive sense, is simply a history of the rival pretensions and diverse results of the artificial and natural systems of management. The artificial system is, perhaps, no system at all, because the practitioner seeks merely to gratify his fancy in forming an assemblage of aquatic plants and animals; the tanks are elaborately decorated with fountains, grottoes, and banners of vegetation, and stocked with crowds of fish.

Under some circumstances the artificial system answers admirably; in others it is a failure from the first, and every repetition of the experiment ends in the same disappointment. For all show purposes the artificial system is invaluable. It has often been my lot to exhibit tanks at soirées, conversaziones, etc., and they have always been greatly admired; but so thoroughly artificial have been the arrangements, that I have sometimes taken up from the garden tufts of *Holcus saccharatus*, *Arundo donax*, and other large plants of graceful habit, and having washed the earth from their roots, have planted (*i.e.* fixed) them in good positions, *pro tem.*, for crowds of gold-fishes, minnows, bleak, etc., to gambol amongst. I remember some years ago, when visiting Leeds to deliver some lectures on aquaria, I had the privilege of inspecting the tanks of Dr. Hobson, which were the most satisfactory exemplifications of artificial management I had then or have since seen. A very elegant room was appropriated to a series of vessels, in which was kept up a constant and copious run of water, the stream passing from tank to tank, the tanks being in a succession of levels, so that from one end of the room all were visible in an ascending series, which produced an agreeable *tout ensemble*, and at the same time made one source of water supply sufficient for the whole. This was a strictly artificial arrangement, but it was perfectly successful. The tanks were all well stocked with fishes, reptiles, insects, etc., classified according to their habits and proclivities, and so grouped that when viewed collectively, the scene was beautiful in the extreme. One more instance of artificial management for show purposes will, perhaps, suffice. When lecturing at the Reading Institution some years ago, I had an accident, and spoiled nearly all the sea-water that had been secured for the display. But I was not to be beaten by trifles. I had enough sea-water left to fill a few large shallow glass pans; into these

pans I transferred the anemones, star-fishes, etc., and gave them just enough water to cover them, and in the show tanks I grouped the large handsome specimens of algæ that had been collected for the purpose, so as, with serpulæ shells, rocks, etc., etc., to make handsome groups, and filled those tanks with water drawn from the Institutional water-butt, and kept the secret to myself. That was a perfectly successful undertaking; the tanks looked beautiful by gaslight, with their grand groups of algæ; and as for the animals, the thin film of water over them, and their recent travel and subsequent transference from their places in the tanks, caused just enough of that peculiar irritation which seems to be needful to cause a full display of the beauties of certain of the radiates, and the audience had the advantage of beholding star-fishes, plumose anemones, and other marine subjects, in the attitudes they habitually assume when safely anchored fathom deep in ocean brine.

The natural system is an imitation of nature, not in outward appearances merely, but in *conditions*. Tanks managed on the natural system may be made to have a most beautiful appearance; and I flatter myself that the example to be presently brought before you could not be easily surpassed for beauty, considering it simply as an appropriate item in a "home of taste." But it is impossible to use such vessels for show purposes; any disturbance of the furniture would be a violation of the most essential conditions, and mere decorations are not to be tolerated; they are, in fact, forbidden by the laws on which the system is based. How do we proceed to carry out the natural system? We form within a vessel or vessels a group or groups of objects in imitation of rock-pools, running streams, lakes, ponds, and so forth. If it is intended to keep in any of the vessels creatures that habitually dwell in mud, there must be a bottom of mud for them. If retiring places and dark recesses are needed, they must be built; whatever is to be the purpose of any particular vessel, it must be prepared in the first instance so as to contain within itself all the conditions essential to success, and when it is completely stocked it must be left to take care of itself; and if it becomes unsightly, or the animals become diseased and perish, then, in that particular instance, the natural system has failed through some error or oversight of the practitioner. Of course in all this there is much that is artificial; for instance, it is artificial to put fishes into glass vessels of any kind, and very artificial to build miniature caves and grottoes of coke or broken bricks; but the term "natural system" is nevertheless quite legitimate, because the endeavour at every step is to illustrate the operation of natural laws; whereas on the other system the endeavour may be

simply to carry out a fanciful device, or a scheme which in its first elements sets the laws of nature at defiance.

AQUARIUM AND FERNERY COMBINED.

CHAPTER II.

A BRIEF HISTORY OF AN AQUARIUM, EXEMPLIFYING THE PRINCIPLES OF MANAGEMENT.

Restless forms of living light,
Quivering on your lucid wings,
Cheating still the curious sight
With a thousand shadowings;
Various as the tints of even,
Gorgeous as the hues of heaven,
Reflected on your native streams
In flitting, flashing, billowy gleams.
Harmless warriors clad in mail
Of silver breastplate, golden scale;
Mail of nature's own bestowing,
With peaceful radiance mildly glowing;
Keener than the Tartar's arrow,
Sport ye in your sea so narrow.

HARTLEY COLERIDGE.

THE tank now to be described was fitted and furnished more than ten years since. It is a simple rectangular vessel, in form nearly a double cube, and its position is in the entrance-hall adjoining the rear wall, where it is sufficiently illuminated to render every part of its contents agreeably visible to the eye, yet it receives scarcely any direct light whatever. It is impossible there should be anything more simple than the furnishing of this vessel, yet it does not lack certain features that render it attractive to unscientific eyes. I fitted it myself, and proceeded as follows:—I procured from the cellar a number of large pieces of coke, some of which were broken to afford ample choice of blocks of various forms and sizes. Those were preferred which had a somewhat rugged face, but which nevertheless were large and flat, giving plenty of linear surface, so as to be best adapted for building a wall of very

moderate thickness. These were two or three times dipped into a thick batter of Portland cement, and were finally cemented together in blocks of suitable width for convenient lifting, with one or two empty flower-pots at the base and within every block. The flower-pots were used to create a flat basis, so that each block would rest on the bottom of the tank securely, and for the additional reason of the increased lightness of the blocks so constructed, the fronts being made solid and massive, yet hollow within, and the pots not at all or only slightly covered with rock on the sides intended to form the backs of the blocks. Thus a rugged wall of rock was formed in a series of detached pieces, massive in appearance, yet of no greater weight than admitted of convenient lifting. Such a wall made of mica schist—which is the best of rocks for aquaria where its weight is of no consequence—would soon have ruined the tank, and perhaps have brought down tank and stand within a few hours of the first fitting. With coke and flower-pots you may build another Tower of Babel, and its weight would scarcely make an indentation on a newly-ploughed field.

The rocks were, as soon as tolerably hard, placed in a large vessel of water. A tank in the garden, used for ordinary garden purposes, answered admirably for the soaking process that all newly-cemented work must undergo before it should be used in an aquarium. The only preparation the tank itself underwent was to colour the back, so that glimpses of the wall should not be seen through any possible interstices of the rockwork. I took some sheets of green tissue paper, smeared the back plate of the glass all over with copal varnish, pressed the paper smooth on it, and by that experiment determined that if it ever becomes needful to colour one side of a tank, the paper and varnish afford the most effectual method that can be adopted. In due time—a fortnight, perhaps, not less—the blocks were taken from the bath and placed in position. A bottom of clean well-washed pebbles was laid down, the tank was then filled with water, and the gold-fishes and minnows were introduced.

That is nearly all that has been done to the tank from that day to this. Yet a few things remain to be said. In the first place, it has been a complete success, and the nature of that success may, perhaps, surprise some of our non-successful aquarians. For instance, the water has never once, during a period of over ten years, been pea-soupy, or even cloudy, or otherwise than as brilliant as all that we have in our mind's eye when talking of the "crystal spring" and the beverage of Castaly. There have been deaths in it—deaths by compulsion, the result solely of experiments made with a view to test the

ENTRANCE HALL, WITH AQUARIUM.

extreme capabilities of the system; but there are in the tank at this time gold-fishes that I have had in my keeping, and that have never been otherwise than healthy and happy, during a period of *more than twelve years*. Furthermore, to keep this tank in order is a matter of such small trouble that it may be literally said to take care of itself. Ordinary dusting and occasional cleansing of the exterior are, of course, necessary, and for the interior there are two operations only that are needful. The fishes are fed with rice boiled in water, or with bread crumbs. I believe that bread is as good a food as they can have, and as it is always handy, it is a great advantage to be able thus simply to perform a duty which is generally too much neglected, for there are still to be found some benighted people who think that gold-fishes can live on the invisible tenants of the tank, and get fat, as it were, upon nothing. The other operation is the occasional cleansing of the front plate inside. This is accomplished by means of a piece of sponge, attached, by means of twine, to the end of a stick, and the stick is thrust behind the tank, so as to be always handy for the purpose. This cleansing of the front plate is performed about once a fortnight during summer, and not more than once in three months during winter; in fact, it might be left undone from November to March, and the view would be unimpaired by even the slightest film of confervæ; but from March to October the growth is sufficiently rapid to produce a perceptible green tinge on the glass in eight or ten days, and this is easily removed by the sponge. In cases of long neglect I find the most effectual mode of cleansing to be with a cloth on which a little silver sand is sprinkled; this, drawn over the glass with the sand, brings away the crust at once, and if carefully done, appears not to cause any serious scratching of the glass, though if the glass were of poor quality, perhaps it might.

The reader has of course taken note of the omission from this history of all mention of the introduction of plants to the tank. I have never introduced a plant of any kind, yet the rocky wall is richly coloured with microscopic forms of vegetation in beautiful green, bronze, and russet patches, and if the glass ends are left untouched, they in time become quite opaque with a dense coating of olive-coloured vegetation. This is one of the grand features of the natural system. I may introduce a thousand plants, Anacharis, Vallisneria, Stratiotes, etc., etc., and they may all perish. But those Dame Nature introduces are sure to live. Being developed *in situ* they are of constitutions adapted to the conditions which exist in the tank, and though it requires a long time for a vessel, *situated as this is*, to become richly clothed with suit-

able oxygen makers, some supply of oxygen is secured from the very first, for I have seen ciliated spores and beginnings of genuine vegetable deposits within a few hours of the first furnishing of a tank. Hence it was that, fortified by previous experiences of the natural system, I did not hesitate to introduce the fishes as soon as the tank was furnished, without waiting for the full development of the microscopic forest, for I knew that before the fishes exhausted the oxygen in the fresh river water, there would be the beginning of a new supply for them, and there was never any distress through that procedure.

I have italicised above the words "situated as this is." The situation of this tank is the secret of its success. Near it on one side is a window facing west. This window lights the hall abundantly, but very few rays of light from it fall directly on the tank. The only direct light which strikes upon the tank comes from the fanlight over the door directly opposite, and that is, of course, but moderate in amount. Now, in the early days, when I wanted a quick growth of Oscillatoria, and other oxygen makers, I had the blind drawn up at the side window, and there was then no fern-case there. The abundance of light caused a speedy diffusion and germination of spores, and as soon as I saw that the vegetation was likely to be too plentiful, I had the blind drawn down, and intercepted the light that still came by means of a fern-case. Thus, by toning down the daylight, and having my tank where an excess of light was impossible, I secured a moderate yet plentiful growth of plants, and have never had one vegetable filament more than needful, except on the front glass, where of course it intercepts the view of the interior. It must not be supposed, however, that the hall is dark in consequence, it is, in fact, well lighted, and very cheerful.

Now a word for the fishes. I find that for a vessel of this sort, which though to me an experimental and scientific affair, is in all other respects a piece of elegant furniture, there are no fishes that may be kept with such certainty as gold carp. My old friends of twelve years' standing (or swimming) have gone through several severe trials, and seem none the worse. I cannot say how much they have grown during this long period; but I think they have grown, though certainly very little. They are tame and lazy, and happy and beautiful, and they have served an important purpose to me besides the adornment of the hall, for, after their ten years' habitation of this tank, having had two years of active experimentalizing previously, they have solved the problem of the cubic space required by a fish for breathing room, and I

shall be able to give a safe rule for the guidance of all cultivators of aquaria. I have arrived at the maximum capacity of my tank in various ways. One way was to introduce occasionally a few new fishes. As common carp abound in a pond close by, a good many have had temporary residence in the tank. Minnows have been used in the same way, and I have also added gold carp, and other fishes which are generally tolerably adaptable in constitution. But it always happened that when the fishes exceeded a certain number there were signs of distress. I could not begin changing the water to obviate this, because that would be to annihilate the natural system "at one fell swoop." No, the water has never been changed, though, of course, it is necessary occasionally to make good the loss by evaporation. But I did try on a few occasions of extreme distress to aërate the water by the use of a garden syringe. Charging this from the tank the water was ejected back with force through some slight atmospheric distance, carrying streams of bubbles to the bottom of the vessel. This would be amusing, because the fishes would rush at the streams of bubbles and absolutely gulp them; but it was tiresome work, and, of course, was only performed by impulse and not by system. The end of every one of these experiments was the same. One or two of the newly introduced fishes would, after the lapse of about a fortnight, be found dead and "floating on its watery bier." Next a few more would die, and so on till the whole of the new comers were cleared off, and the old, well-seasoned members of the "happy family" remained unhurt, but breathing more freely for the relief, and no doubt rejoicing to have got rid of the innovators. Suppose now that you have some gold-fishes, averaging four to six inches in length; if you desire to preserve them for any length of time by the natural system, and under circumstances at all resembling the case here described, for half-a-dozen of those fishes you must have a vessel holding at least twenty-four gallons of water. The smallest of your fishes will need three gallons, all larger four or five gallons. Most of the failures in tank management have resulted from over-stocking, but the modification of the light is an equally important matter. This chapter may reasonably conclude with three lines from Cowley:—

> "Let Art use method and good husbandry;
> Art lives on Nature's alms, is weak and poor;
> Nature herself has unexhausted store."

CHAPTER III.

CABINET VIVARIA.

The heart is hard in nature, and unfit
For human fellowship, as being void
Of sympathy, and therefore dead alike
To love and friendship both, that is not pleased
With sight of animals enjoying life,
Nor feels their happiness augment his own.

COWPER.

DOMESTIC vivaria may be of many kinds for the gratification of many tastes, and as aids to the acquirement of a knowledge of Natural History. It is not intended here to present even the faintest sketch of the possible extensions of the idea on which the aquarium is founded, but it would be a too summary method of procedure to omit mention, at least, of a few groups of animals that possess peculiar attraction for the home student. We must incur the dreadful risk of an accusation of introducing "ugly things" to the notice of the reader, and will only, in vindication of the present chapter, quote the words of the rebuke to the apostle Peter "what God hath created call thou not unclean."

Amongst the animals which will be likely first to claim attention after the aquarium proper has been fully furnished, are certain reptiles and batrachians. For the accommodation of these, the best arrangement is that of an island surrounded with water, and enclosed in part with strong wire gauze, and in part with glass. Whatever design may be determined on, provision must be made for ensuring the utmost cleanliness and perfect ventilation; for not only is it desirable to help the collection in health, but it should at all times have a seemly appearance—our hobbies should be decently dressed, and bear at all times an inoffensive aspect.

The figure placed at the head of this chapter represents a vivarium, which for many years was devoted to a collection of lizards, tortoises, and frogs, a few of them really beautiful creatures, all of them interesting and affording endless amusement. In the centre was a block of peat, with its natural herbage of moss, and a dead tree firmly fixed for such of the inmates as were accustomed to climbing. The two troughs were receptacles for water, to which the animals had ready access, whether to bathe or drink. The greater part of the frame-work was filled in with glass, let into grooves without putty, but the ridge line of the roof and the sides of the water troughs were wire gauze. House flies, spiders, butterflies, and other small lively insects were introduced to afford the proper inhabitants a choice of diet, and generally speaking, when these became scarce, the animals were so far torpid that food was not required. The general plan of such a structure may be varied almost indefinitely, and to almost any degree of elaboration. A suggestive design for the combination of an island, for ferns and a few lizards, with a collection of fishes, will be found in the figure of the fernery-aquarium at page 48. In carrying out a design for such a purpose a few precautions will be necessary to ensure success. Ventilation and cleanliness have been remarked upon as of the utmost importance. Now it will tend greatly to the attainment of these conditions, if as many parts as possible of the construction adopted are made moveable; where it is not necessary that the glass should be water-tight, it will be folly to make it air-tight. In exemplification of the ease with which the after management may be provided for, the vivarium on page 55 may be referred to. In that, all the larger sheets of glass may be lifted out in a moment, as they slide down in grooves and are not fixed at all. But a far better plan is to have the glasses fixed in moveable frames, which can be held in their places by pins or buttons, as the handling of sheets of glass might at times prove dangerous. The receptacles for water should be as readily

accessible as any other part. Those in the figured case are zinc troughs or boxes which can be lifted out at any time. A more convenient method, perhaps, would be the adoption of an open sliding trough, made to draw out, a piece of wood or something of the kind taking its place until returned.

Amongst the more easily obtainable and amusing animals that should be sought for a vivarium, are lizards and frogs. Chameleons are not well adapted for confinement in these constructions, but may be kept in perfect health and safety on a shelf over a fire-place, or in a sunny window, a twiggy branch of a tree firmly fixed in some kind of stand being all they require. It will need an immensity of enthusiasm to make much progress with reptile vivaria, for small vexations and difficulties will occur to discount the interest, and the constant trouble of finding food for the collection will tell against it seriously with those whose patience is not of the most enduring kind.

It is not desirable to enumerate the creatures likely to be kept in small vivaria, but we must give especial attention to one which may be regarded as most desirable of all—the pretty green tree-frog.

There are several species of frogs which may be collectively described as "green," but the green tree-frog is most distinct in appearance and habit from all the marsh-inhabiting ranæ, for it is amphibious in only a qualified degree, and, as its name implies, it lives very much among the branches of trees. It is known among naturalists as *Hyla arborea*, sometimes as *Hyla viridis*, on account of its bright green colour. It is a native of France and Germany, hence readily adapts itself to the climate of this country, and will, perhaps, some day be acclimatized as an addition to our fauna. This little agile frog is of a vivid emerald green colour over the whole of the upper surface of the body, with the exception of two black marks, which extend from the eyes to the inner side of the shoulders. Beneath, his colour is a greenish white, and the skin is semi-transparent, and of a most delicate texture. The eyes are prominent, and of a lustrous black, as beautiful, indeed, as the eyes of a toad, which are among the most beautiful of all the eyes in creation, except, of course, the eyes through which a human soul peeps. *Hyla arborea* has a particularly neat contour, full-grown specimens are not more than half the size of the common frog, but the structure is more compact and graceful; and when in activity, the long legs and button toes indicate at once its chief characteristic, that of climbing and leaping. The activity of the creature adds to the interest we derive from its beauty when kept as a pet. Its habit is to sit perfectly still on the summit of the rockwork in the glass, or on a flat

leaf of a plant when set at liberty in a greenhouse; but the moment a fly passes, it wakens up, becomes restless, and screws its legs together for energetic action. Fixing its beautiful eyes on a buzzing bluebottle, froggy waits his opportunity, and presently at one spring he pounces on the victim, and swallows him whole. It is in the taking of its prey that we are enabled to note particularly the manner in which this frog is equipped for the curious life it leads.

Though it delights in water, and needs to have it always within reach, it is in summertime but partially amphibious. It will now and then swim round, and then ascend the glass, where it will remain motionless for hours, holding tight by means of its toe-suckers and the delicate membrane of the stomach, which indeed it depends on chiefly when attached to a smooth surface. A ten-inch bell-glass affords plenty of room for half-a-dozen of these frogs, and escape is prevented by covering the top with wire gauze. Once or twice a week they should have liberty to leap about and climb the windows, to catch flies for themselves. Meanwhile, the rockwork is lifted out, the pebbles washed, and the glass cleaned, and the whole made bright for use again. They become very tame, and will sit on the finger, and leap from it when the buzzing of a blow-fly arouses them.

WARDIAN CASES.

THE FERN CASE AND FIRESIDE GARDEN.

In princely halls, and courts of kings,
Its lustrous ray the diamond flings,
Yet few of those who see its beams,
Amid the torchlight's dazzling gleams,
As bright as though a meteor shone,
Can call the costly prize their own;
But gems of every form and hue
Are glittering here in morning dew;
Jewels that all alike may share
As freely as the common air.

CHAPTER I.

FIRST PRINCIPLES CONSIDERED.

FERNS induct us pleasantly into one of the quietest regions of vegetable life, a region in which flowers are unknown, and yet where those who love flowers most will least of anywhere miss them. The estimation in which ferns are held may be considered a measure of individual culture, and a reflex of the refinements of domestic life. They make no appeal to a superficial taste; they demand for the appreciation of their beauty a delicate discernment of their distinctive forms, having but few attractions in respect of colour to engage the attention, much less win the admiration, of the unobservant or the careless

who might be struck with surprise at the splendour of a display of flowers or fireworks. They have never held a higher place than now in the circle of household adornments; indeed, their adoption as domestic pets is of the most recent date, and to recall the circumstances of their introduction to the fireside has at least one pleasing accessory in the necessary association of the fact with the memory of a good man, who was amongst us when "Rustic Adornments" first bid for public approbation, but has since gone to his rest. It may be claimed for ferns, in an especial manner, that they have conferred benefits on their votaries without becoming thereby associated with any such folly or extravagance as we are compelled to record with regret when we trace the history of many other subjects which have been conspicuously numbered amongst domestic recreations. If there ever was a "fern mania" it was a harmless one. If compared with the "tulip mania" it stands apart as bright and pure as the ferns themselves; and its incidents will justify us in saying, that the quiet that belongs to ferns in their own natural world is to be found also in the taste which finds gratification in collecting and cultivating them.

The fern-case, whether it be a grand or an humble example of its class, is the best reminder of the existence and plentifulness of beauty in the out-door world that we can have for all seasons close beside us in our homes. When the woods are leafless, and the fields and gardens destitute of attractions, the little fireside garden still shines in emerald green, and russet brown, and gold and silver leafage, safe from frost, suggesting that the time is not far off when the woods will be robed again, and ten thousand flowers will spring forth to welcome the renewal of the season of song. The exquisite beauty of a good collection of case ferns skilfully managed may well account for the popularity of this class of plants amongst residents in towns, who by means of a fern-case can secure a garden in the closest and smokiest localities, where, if exposed to the influences of the poisoned atmosphere, scarcely any kind of vegetation long survives. Especially valuable to the invalid is a fern-case; it affords amusement without exertion; a subject for study unattended with fatigue; an innocent, cheerful, remunerative relaxation from cares, and a perpetual antidote to weariness and ennui. It is in the city, without doubt, that the fireside fern garden is most precious. The citizen may refresh himself with the sight of a meadow by travelling to it, he may even here and there see in the centre of the town a few old trees peering above the black roofs, and which, from their forms rather than their colours, are distinguishable from chimneys, and he may, with great care, preserve a gaiety in his narrow garden

in the midst of darkness and smoke; but to have real verdure in the freshness of its original strength and life, there is but one method, and that is by the culture of it in Wardian Cases. Not only may many ornamental plants be thus preserved in their full beauty in the midst of surrounding dust and the fumes of factories, but the rarest forms of vegetation readily submit to domestication, and attain their highest development of beauty in these cases, if the requirements of their constitution are severally fulfilled.

It was in the year 1829 that the late Mr. Ward placed the chrysalis of a sphinx in some mould in a glass bottle covered with a lid, in order to obtain a perfect specimen of the insect. "After a time, a speck or two of vegetation appeared on the surface of the mould, and to his surprise turned out to be a fern and a grass. His interest was awakened: he placed the bottle in a favourable situation, and found that the plants continued to grow, and maintain a healthy appearance. On questioning himself about the matter, the answers readily presented themselves, inasmuch as air, light, moisture, and other requirements of the plants were contained within the bottle."

This was the first Wardian Case. Mr. Ward extended the experiment, and arrived at the conclusion that certain kinds of vegetation readily adapt themselves to an unchanged atmosphere in a *close* structure of glass, and to account for such an apparent departure from the recognised laws of vegetable growth, certain explanations as to the absorption of carbon and the evolution of oxygen were offered, and quite an elaborate theory of vegetable physiology was the consequence. It was admitted, reasonably enough, that it is impossible to make a Wardian Case on such a plan as wholly to exclude the outer air, but at the same time it came to be generally accepted that, for all practical purposes, such a case might be sealed hermetically, change of air, in the ordinary acceptation of the term, being quite at variance with the theory of vegetation as applied to these cases. Mr. Ward himself industriously taught that a plant-case is a self-supporting structure. Once set going, the exhaling moisture trickles down the glass, refreshes the herbage, and rises again to be again condensed, while the air in the case is alternately charged with excess of carbon or oxygen, the plants being always occupied in restoring it to a normal tone, spite of their tendency to vitiate it; that, in fact, they create an atmosphere of their own, and thrive without external aid and independent of external agencies. It does not detract from the merits of the inventor that we disregard his theory, and abandon entirely the doctrine that the closer a case is kept the better for the plants within it. Nor is our obligation lessened if

we abandon also many of the inventor's proposals as to the kinds of plants that may be grown in cases, and restrict the selection to far fewer families than he considered suitable. It is not because a plant will simply live for a time with less light and air than it obtains in its natural habitat, that we should consign it to a case; our rule should be to give preference to such as will really thrive in close confinement, and though they are by no means scarce, they are less numerous than Mr. Ward supposed when he published an account of his experiments, and the conclusions he deduced from them in his interesting pamphlet "On the cultivation of plants in closed cases."

A few leading principles must be kept in view in the construction and management of these contrivances. These we will endeavour to state briefly, but explicitly.

The form and the dimensions of a fern-case are to be determined by individual tastes and requirements. As a rule, the larger the construction the better, an abundance of light and a large body of air are favourable conditions for the plants. But usually it is necessary the contrivance should be portable, and that must be borne in mind. The lighter the construction, consistent with sufficiency of strength the better, for not only must the ferns have as much light as possible, but we must have, as far as may be, an uninterrupted view of them. Heavy woodwork and cumbrous designs are offensive to good taste, injurious to the plants by robbing them of light, and, it may be, calculated to render an apartment dull and unwholesome which otherwise would be cheerful and healthy. It is a great advantage in the management of the collection if the several parts of the construction can be readily separated. This is not possible in every instance, but a near approach may be made to it by providing more than one door, so that the ferns may be reached without difficulty from two or three sides. Provision must be made for the free escape of water from below, and the admission of air above. In no particular has the theory of Mr. Ward been more completely overthrown than by the common experience of cultivators in respect of air-giving: ferns kept as nearly as possible hermetically sealed, become weak, attenuated, pale, sickly; but regular ventilation and abundance of light promote a robust growth, and the healthy plant is always the most beautiful.

Given the properly constructed case, we have next to consider the aspect in which to place it, the plants suitable to furnish it, and the soil in which the plants are to be grown. The first point is easily disposed of. *Any* aspect will suit a fern-case. If peculiarly exposed to sunshine it may not be so well

for ferns, but it very rarely happens that in any apartment the sunshine is too strong even for these shade-loving plants, provided they have plenty of air; if kept very close, strong sunshine tries them in a painful manner, but if kept in vigorous health, a moderate amount of sunshine will intensify their health, and cause a free production of fully-developed fronds, and also of crowns and rhizomes for the extension of the specimens. There are just two considerations that may detain us for a moment in connection with the sunny aspect. First, as the sunny windows are usually wanted for flowers, or for the sunshine only, and as ferns will thrive with plenty of light in a north aspect, it is not usual to give them a south exposure; and as they do not absolutely need it, there is no necessity to place the fern-case in the most sunny position. Second, if it suits to furnish a south window with a little fern garden, excess of sunshine may be easily screened out, by means of a blind or a sheet of paper, which should be used only for an hour or two at mid-day when the light is strongest.

Next, as to the plants; make experiment to any extent you please, and chronicle all your successes, and such of your failures as are likely to be instructive; but in the first instance, adopt only such plants as are known to be adapted to this kind of treatment: they are plentiful enough, but far fewer than good Mr. Ward supposed. He even proposed to grow salads in close cases, but it is a question if he ever put upon his table a salad produced in any room of his residence in Finsbury Circus. Ferns, selaginellas, and mosses, comprise the inmates that are most likely to enjoy life in such artificial conditions, as "to the manner born." A few orchids, palms, and succulent plants may be grown to a fair degree of perfection in cases, but they are not adapted for beginners. The common ivy (*Hedera helix*) succeeds astonishingly well in a fern-case, and may be turned to good account where a screen of glossy-green leaves is needed to shut out an unsightly view, and the amount of light and air available for vegetation are too limited for bold experiments in gardening. Many readers of this will doubtless call to mind the beautiful sheet of ivy filling a window garden, years ago, at the residence of Dr. Conquest, in Finsbury Square.

The soil for a fern-case is a most important matter. Common earth taken from a garden is no better than paste or putty; not one of your plants will live long in it. The very best leaf-mould, such as a skilful gardener would employ for potting purposes, will answer very well, if a fourth part of its bulk of silver sand be added. But the staple soil should be friable peat of a dry fibrous texture, with sufficient sand added to give it a decidedly gritty

character. To say how much sand should be allowed to any given measure of peat is impossible, for the best kinds of peat contain so much silicous grit that there is no occasion to add sand at all. Other kinds of peat are silky and mellow, and evidently deficient of silica; in this case it must be broken up small, and a large proportion of sand thoroughly intermixed with it. A peat or bog earth, of a black, greasy texture, is to be avoided as unsuitable; on the other hand, a soil on which the common brake, the ling, and any other of our native ferns and heaths grow plentifully, is sure to suit for the fern-case, if a liberal proportion of sand be added.

It is easy, some will say, to prescribe the soil, but in some districts far removed from heaths, it is difficult to obtain it. Granted: but then recourse must not be had to the soil of the garden or the hedgerow even, unless the practitioner has some actual experience in the matter. Wanted, then, a patent preparation. Happily, we can provide one that may be obtained anywhere through the aid of railway or carrier, as a shop article. Mix together equal quantities of cocoa-nut-fibre refuse, pounded charcoal, good loam, and silver sand. This is a capital mixture, and as for the loam, whatever is known in the distinct as a "loam" will answer the purpose. Yet, another: chopped moss, flower-pots pounded almost to dust, common loam, silver sand, equal quantities, thoroughly blended together. It remains now to describe a few applications of these principles, and the rule will be followed of illustrating the several features of the subject by examples of our own.

Small case for filmy ferns, the Moonwort and the Adder's-tongue.

FERN VASE.

CHAPTER II.

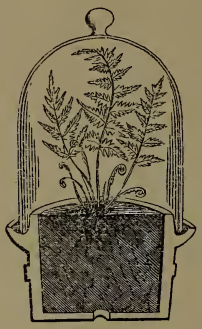
DESCRIPTIONS OF FERN-CASES.

"Mighty Flora, goddesse of fresh flowres, which clothed hath the soyle in lusty green,
Made buds to springe, with her sweet showers, by influence of the sunne shine;
To doe pleasannce of intent full cleane, unto the states which now sit here,
Hath Ver downe sent her own daughter deare."

LYDGATE.

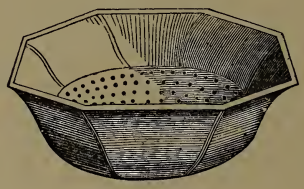
WHAT is the simplest form of fern-case? A flower-pot, with a bell-glass to fit close down upon the soil within the rim of the pot, in which one fern alone is planted. And a very pretty ornament such a simple fern-case may be, with a fine plant of the erect variety of *Asplenium marinum*, or one of the tasseled kinds of *Scolopendrium vulgare*, to occupy it. An improvement upon this simplest form is the contrivance known as the "West Kent Pot," which is made of hard red ware, with a little exterior ornament, and a rim (or groove) expressly to receive the bell-glass, as shown in the sectional diagram of one in operation. The next stage of the same idea is the "fern-shade" proper of the horticultural glass manufacturers. This consists of a glass pan, in which the ferns are planted, and a glass shade fitting to it, which can be lifted off at pleasure, and should be lifted off periodically to give air and allow of evaporation, for it is not right to keep the ferns constantly bathed in the moisture which exhales from them. From this stage we pass to vases, which may be furnished with glass shades if their diameter does not exceed eighteen or twenty inches at the utmost, but

if they overpass that measure a rectangular framework must be constructed for them. We present figures of two of our fern-cases, in the form of stone vases with glass frames. They differ in height and style of planting, but agree in principles of construction and management. The tallest has been in use nearly twenty years, and is now rich in vegetation, though a few of the plants have occupied their present places through the whole of that period. The other is a younger example, quite as good, but, to us, less interesting, because it has no special history. We will consider the tallest of the two first, a proceeding warranted by its importance, for it has had a place in the entrance-hall for many years past, and is well known to hundreds of friends who will read this. The vase is an example of Ransome's imperishable siliceous stone, hollow throughout, the tazza fitting loosely on the plinth to admit of turning it round. In other words, this is a "revolving" vase. The foot is a hollow



frame of wood, painted in imitation of black marble. It is hollow for the sake of the carpet or floor-cloth on which it stands, for a solid foot is apt to communicate moisture to what it rests upon, and so do mischief. The tazza is fitted with a perforated zinc pan, in which the ferns are planted, and into the pan is fitted the frame, which can be lifted off bodily in a moment by any one who has the strength to do it. The frame has two doors, that is to say, two plates of glass on opposite sides are on hinges, and open at a touch; thus air can be given as desired, and it is easy work to make alterations and give cultural attention to the ferns within. Moreover, to secure ventilation constantly, in spite of the cultivator, (who may be nodding, or away

from home occasionally,) there are two bands of perforated zinc in the framework, one at the junction of the upright plates with the lantern top, the other at the summit. The framework is all of zinc, the glass is plate glass, the stone is painted stone-colour. Unpainted stone is very well for a time, but painting becomes at last necessary for the sake of its clean appearance and easy renewal by washing. Whoever paints a thing of this sort must know what is meant by "flatting." The measurements are as follows:—From the base of the stone plinth to the base of the tazza twenty-four inches; depth of tazza nine inches; height of glass frame to base of lantern twenty-five inches; height of lantern eleven inches: total height (exclusive of wooden base four inches) five feet nine inches. The tazza measures two feet across.



Within the lantern are suspended four half cocoa-nut shells in which ferns are planted. These are prepared by carefully sawing the edges to remove the rugged outlines of their original cleavage, and by burning holes for drainage and for the ferns to grow through them, and also for the insertion of small hooks or ties of wire for suspension. The finest copper wire answers well for suspending, and they must be attached to small hooks above, in order that they may be lifted out whenever it becomes needful to moisten them by dipping.

This case contains at the present time two pretty climbing plants; one is the common ivy of the British woods, *Hedera helix*, the other is *Lygodium scandens*, an elegant climbing fern. The palm-like fern in the centre is *Nephrolepis exaltata*, the finest fern in the world for a centre piece, both because of its character and that it may be cut without spoiling it, if it happens to grow too tall. With it are examples of *Pteris cretica albo-lineata*, an elegant variegated fern; *Niphobolus lingua*, a hart's-tongue-like fern; *Onychium Japonicum*, most delicately divided; *Pteris crenata*, *Lastrea glabella*, *Doodia caudata*, *Asplenium viride*, and some bits of *Selaginellas*, *Anemone nemorosa*,

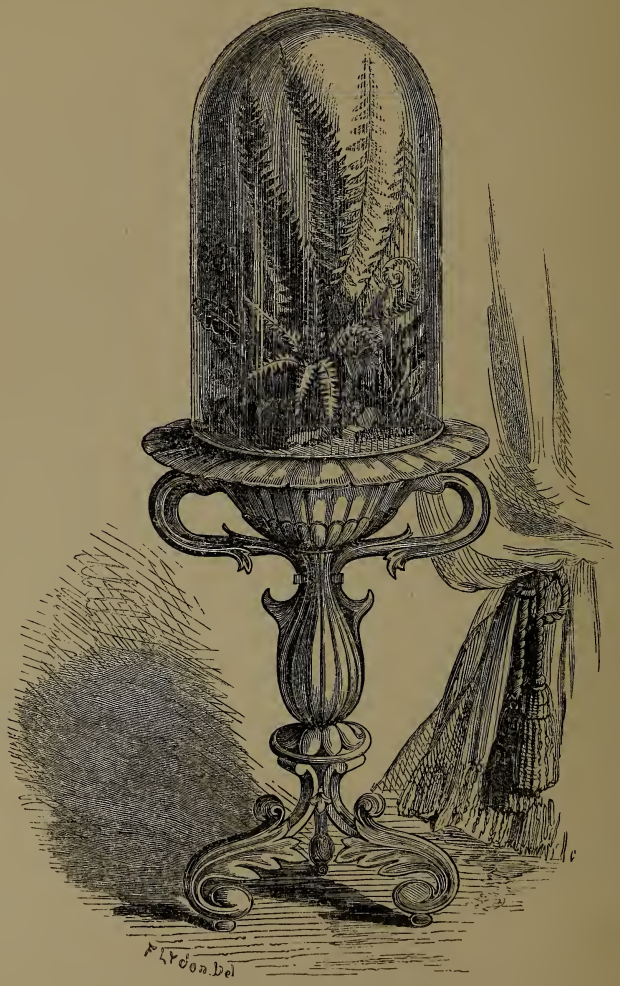
FL

and a few *mosses*. The ivy gained a footing quite by accident. This, with other of our cases has been frequently exhibited. On one occasion, in preparing some cases for a festive meeting, we introduced into this a number of little twigs of common ivy between the ferns. The case was left undisturbed for a few weeks afterwards, and then, on removing the ivy, it was found that one of the twigs had rooted. It was therefore allowed to remain and it soon formed a rich sheet on one side of the glass, without robbing a single fern of a ray of light. There it remains to this day; it is now some nine years old as an inhabitant of the case, and is as vigorous as ever. A few lengths of fine copper wire serve to train the ivy and the lygodium, which add very much indeed to the beauty of this little garden. This case occupies a window always, and has only the warmth of an ordinary room during winter. The corresponding example differs but slightly in measurements, but is somewhat more artistic in design and proportions, though none the better on that account for the ferns which occupy it. The window in which this is placed enjoys a large amount of sunshine, and the room is kept at a comparatively high temperature all the winter, though never higher than the average of a constantly-used dining-room. The ferns are all tender kinds. In the centre is a fine plant of *Cheilanthes farinosa;* the others comprise *Anemidictyon phyllitidis*, *Olfersia cervina*, *Diplazium radicans*, *Asplenium fragrans*, *Lomaria attenuata*, *Pteris calomelanos*, *Fadyenia prolifera*, and a few tufts of the metallic *Selaginella cæsium* and *S. lævigata*. The lantern of this case fits loosely on the upright glass, and may be easily lifted off entire for ventilation.

From vases we pass to what we may call boxes, as the next stage of ascent in the degrees of excellence. If the cultivation of ferns in the highest degree of perfection possible in a case of any kind is the object in view, then the rectangular cases which Miss Maling recommended so ably and perseveringly are undoubtedly the best. At page 60 of the "Fern Garden" is figured the first case of this kind which we furnished, and at page 52 of the same work the improved stand which we afterwards adopted for these cases. They are extremely simple in construction, but might be improved nevertheless, especially as to material, for the zinc trough in which the soil is placed soon rots away, and then affairs go wrong. However, if we take them as we find them, they are worthy of regard, for with reasonable care they last a good many years, and there is nothing obtainable in the ordinary way to equal them, if the health of the ferns and the display of their beauties are the principal objects we have in view. The lower part of this case consists of a two-fold trough,

the under part of which is periodically filled with hot water, and the part immediately over is permanently filled with soil and planted with ferns. The upper part consists of five sheets of glass fitted into wooden frames; these are not fixed together to form an unalterable box, but come together as so many cards in a pack, and when placed in proper relative positions to form the glass box are so maintained by means of screws. Our plan of managing them is to remove the screws and have hooks and eyes fitted by a carpenter; this renders it an easier matter to get at any part of the case instanter, by taking out the top or one of the sides. As a matter of course, the owner of one of these constructions is not bound to supply it with hot water, whether by means of a lamp or by periodically changing the contents of the water trough. It is a great convenience, in respect of fern culture, thus to have command of stove heat for the tender kinds in a fernery of such small dimensions, but it is a great inconvenience (at least so we have found it) to keep up the hot water system in its integrity, and so for some years past we have given up that part of the business, and keep all our cases on what we may call the cool system. Having a heated fernery of sufficient dimensions to constitute a "fern-garden" for tropical ferns, renders it the less necessary for us to maintain artifical heat in these cases. But we have long since agreed that those who have no heated fernery beyond the dwelling-house, in which to grow tropical ferns, would do well to be content with managing their cases on the cool system, for the hot-water system occasions considerable trouble, and if once commenced must be continued, or the risk to the ferns will be considerable.

We have several of these rectangular cases in operation, but will describe only two; and these two with sufficient fulness both to explain them as they stand for ornamental purposes, and also to illustrate in some measure the principles of furnishing and management. One of them measures four feet in length by two feet in breadth and height, and is fitted as represented in the sketch which accompanies this. The other is of less dimensions, and is fitted in the ordinary way, the surface being varied with bits of rock and miniature mounds, so as to display to the best advantage the various characters of the plants. What is of more importance is this, that the small case is filled with cocoa-nut-fibre refuse and charcoal alone, with a substratum of potsherds; the large case is filled with fibry peat, torn to shreds, and admixed with silver sand, with special preparation in some instances, for particular plants. The behaviour of the ferns is very different in one case to what it is in the other. In both their growth is more than satisfactory, yet there is a decided difference. This



Common fern-shade with ornamental stand.

is a very interesting fact, discoverable only by keeping two or more distinct collections in the two distinct kinds of soil for some time, and noting the difference, if any. In the cocoa-nut refuse the growth is surprisingly luxuriant and rapid. As an example, a plant of *Adiantum cuneatum*, turned out of a four-inch pot, and put in the case containing cocoa-nut fibre, extended itself in six months, so as to cover a breadth of fifteen inches each way; it became, in fact, too large for its domicile, and several small-growing ferns had to be removed to save their lives, for the adiantum threatened to suffocate them. The following spring the adiantum threw up its new fronds with such vigour as almost to lift up the top glass, and the next thing needful was to take it out, reconstruct the rockery, and plant again so as to allow more head-room. A very small plant of *Pteris cretica albo-lineata*, put in late in the summer, threw up its fertile fronds so vigorously the next year that it became needful to peg them down, and the ensuing spring it was transferred to the centre of a very large case, principally to give it head-room, which it must have when it attains to its full characteristic growth. So much for the bright side of cocoa-nut fibre, or shall we add that it holds moisture tenaciously, never exhibits the slightest trace of any kind of mildew, and has a most pleasing appearance in the fern-case, its nice brown tint showing up the green of the ferns delightfully. On the other side it must be said against the cocoa-nut fibre that the ferns grown in it are somewhat like those plants in our Lord's parable of "the Sower," which sprang up from seeds sown on the rock and among the thorns, and which therefore had no power of durance. We will illustrate this by an experiment. Let us remove the top glass from each case until the sun shines on them, and in an hour's time see what effect a little fresh air has upon the ferns. The hour has elapsed: those in the cocoa-nut dust are, in some instances, half dead, and their fronds have fallen like so many rags, others look slightly flagging, and will evidently be the better for a dewing and immediate shutting up. In the other case, the plants that are rooted in fibry peat and loamy mixture, are scarcely any the worse for the breath of air that has blown upon them, there is not one in a collapsed condition, and all are evidently of more robust constitution than those that have suffered so severely. But to make the balance as nearly as possible equal, the peaty soil does not produce so luxuriant and rapid a growth. The ferns come to perfection in it, but at a slower pace, and, in case of any accident, as of a square of glass being broken, or of neglect in watering, the ferns in the peat will suffer less than those in the cocoa-nut dust. It follows, from this, that the cocoa-nut dust is invaluable

for the growth of seedling ferns and to help on young plants till they are of a size to be transferred to a more substantial soil; but that, when a case is planted in such a way that there is no reasonable prospect of it undergoing any alteration for a year or two, a peaty mixture will be preferable to cocoa-nut in every case, if it can be obtained. Having used the cocoa-nut fibre in ways almost innumerable, we recommend to fern-growers a mixture of one part good yellow loam with two parts cocoa-nut fibre, with one part silver sand, the whole thoroughly mixed and almost powdered together. In this mixture any and every fern will grow luxuriantly, and yet with sufficient substance to endure a few vicissitudes without harm.

The case here represented was planted with two objects in view—first, to create as picturesque an effect as possible, and secondly, to prove the fitness of certain ferns for a certain routine of treatment. It fell to my lot, as one skilful in such things, to construct the mimic archway, and fill it with "pockets" for the reception of small ferns. For that purpose I took two square seed-pans, and placed them bottom upwards on the zinc floor of the case as the abutments, which, of course, when the case was filled with soil, were hidden from view. From the flat foundations of burnt clay thus provided, I began to build, using small pieces of coke dipped in a batter of Portland, and spending a few hours every day for four days in succession upon the work ere it was completed. In the pockets were inserted specimens of *Cystopteris regia*, *Camptosorus rhizophyllus*, *Asplenium flabellifolium*, *Scolopendrium vulgare var. ramosum*, *S. vulgare polyschides*, and *S. vulgare ramo-marginatum*, *Adiantum hispidulum*, and a few *Selaginellas;* the latter soon grew so as to smother the whole fabric, forming a rich belt of various tints of blue and green, with the ferns pushing through them. On the right hand side of the arch was planted *Nephrolepis exaltata*, one of the most superb of Wardian-case ferns, and remarkably distinct with its graceful arching polypodium-like fronds. On the left hand *Nephrolepis pectinata*, which is of the same habit of growth, and a very beautiful and interesting fern; nevertheless less beautiful than the other, as it is also less vigorous. A small plant of *Platycerium grande*, the "Elk's horn" fern, was then planted in the husk of a cocoa-nut, and suspended by copper wire to the crown of the arch, and in twelve months its new growth was so vigorous that it had to be removed, and is now flourishing in the greenhouse. Two more notable ferns were introduced, namely,—*Pteris flabellata var. crispa*, a very erect and characteristic fern of large growth, quite cheap and common, and one of the best

RECTANGULAR FERN-CASE, WITH ROCKERY AND FERNS.

for glass cases of at least two feet in height within. The other was our fine old hardy friend *Cyrtomium falcatum*, which is worth a place anywhere among ferns, and fortunately it will grow anywhere, and is always noble. As for the rest, they consisted of various small and comparatively choice subjects, which I shall name as they occur to me—*Pteris scaberula*, very beautiful in the lace-like divisions and light green hue of its fronds, but has a habit of running about by means of its extending rhizomes, just as if the case belonged to it, and not to you. It is really a gem, and always grows well in peat, cocoa-nut fibre, or any soil of a light spongy texture. *Doodia lunulata* and *D. caudata* are of small growth, and serve well with *Lomaria lanceolata* and *L. spicant*, to fill up with green tufts between ferns of very distinct and striking appearance. In the centre of the case, but on the side opposite to the view here given, and hence hidden by the platycerium, a plant of *Phlebodium sporodocarpum* made a fine effect; it is one of the most distinct and beautiful and easily managed of all Wardian-case ferns, but it does not like cocoa-nut fibre, and must always have a nice peaty mixture. *Polypodium phegopteris* and *P. rugulosum*, *Campyloneurum phyllitidis*, *Adiantum formosum*, *A. pedatum*, and *A. tenellum* have all done well in this case. The varieties of *Scolopendrium vulgare* enjoy a position like this, the damp, shade, and coolness of the case seem to be exactly the proper conditions for their perfect development.

One very important point in determining the success of these, is that they should be constructed so as to move about easily, which allows of occasionally turning them quite round and giving those previously farthest from the light a larger share of it for a season. Those made for us have been very unsatisfactorily mounted, and we have had them fitted by a skilful carpenter with a deep skirting frame all round, and stout legs with large brass castors. The consequence is that they move about at a touch, so that a lady engaged in fern-growing may wheel them about with as much ease as Atlas and Hercules used in classic times to play at marbles with the planets. It is no small matter to be compelled to let a case stand as a fixture when a small shift to vary the light upon it may make all the difference between the life and death of some precious pet, or have the alternative of bringing the whole affair to the ground with a crash.

CHAPTER III.

MANAGEMENT OF FERN-CASES.

O, blessed things!
At sight of this your perfect innocence,
The sterner thoughts of manhood melt away
Into a mood as mild as woman's dreams.
The strife of working intellect, the stir
Of hope's ambitions; the disturbing sound
Of fame, and all that worshipped pageantry
That ardent spirits burn for in their pride,
Fly like disparting clouds, and leave the soul
Pure, and serene as the blue depths of heaven.

WILSON.

THE leading points in the management of fern-cases have been in some part stated in the former portion of this section, and it only remains to gather up here the several threads into an orderly skein. The cases may be considered under two heads, those that are unassisted with artificial heat, and those that have that advantage. They may also be considered under two heads as to furnishing, for they may either be planted with subjects intended to remain and attain their fullest possible development *in situ*, or be kept furnished with plants in pots. The easiest to manage are the unheated cases; indeed it is but proper here to warn the reader that a heated case—no matter by what method the heat is supplied,—entails an immense amount of trouble, a greater amount of trouble in our opinion than it is worth, except to such as can devote abundance of time to it, and who count trouble as nothing when engaged heartily in an elegant recreation. The unheated case will in great part take care of itself as to temperature, but some skill and care will be required to

guard against possible injury by extreme temperatures. Any aspect except due south will suit, except in winter time, and then a south aspect is decidely desirable, for the occasional glimmerings of sunshine in the dull season will benefit the inmates of the case. It may happen that exposure to sunshine in spring and summer cannot be avoided; in that case, draw down the blind from about 11 to 2 on sunny days, or if that be not practicable, lay a newspaper over the case, taking care to remove it when the day has somewhat advanced. Bear in mind that ferns will bear without harm a considerable amount of sunshine, if they are freely ventilated, and at all times inured to full daylight. In the winter another course must be pursued in order to prevent injury by frost. Slight frosts of short duration will do no harm, and we must suppose the room to have the benefit of a fire. But severe and long-continued frost will prove injurious if the ferns are left to their fate in the window. It is a good plan during severe winter weather to draw the case away from the window into the middle of the room; this will probably make a difference of ten degrees of temperature in its favour. The manner in which our cases are mounted on well-built frames with powerful brass castors renders this an easy matter, but it may happen that the case is immoveable, in which case some kind of woollen garments must be provided. Pieces of old carpet, cloth table-covers, and other such protecting materials are usually available, and must be adopted in time, with the view of preventing a single frond at any time from being frozen.

The methods of heating cases vary, but they are nearly the same in principle. There is a boiler below the trough in which the ferns are planted, and this is either supplied with hot water from time to time, the cold water being at the same time removed, or the water is kept hot by means of a flame of gas or oil lamp. Whatever be the plan of heating, a good thermometer should be kept within the case, and of course the smaller it is the better, so long as it can be depended on. Throughout the winter the thermometer should be kept as nearly as possible at an average of 50°. It may rise to 60° as spring advances, in order to assist the new growth which will then be pushing, and at the end of April or very soon after, (as the weather may determine,) heating should be discontinued until about the middle of September, when heating must be again resorted to. An endeavour should be made to keep the temperature down to 45° during November and the first half of December, to afford a season of rest, after which it may rise gradually to encourage the new growth.

Ventilation has been remarked upon already as necessary to the health of the plants. The cultivator's chief care should be to avoid extremes. A few choice ferns, such as those of the genera *Trichomanes*, *Hymenophyllum*, and *Todea*, do not need ventilation at all, and therefore it is advisable to grow them in groups, apart from a mixed collection. But as a rule ferns will bear, and be benefitted by much more air than is commonly allowed them, but a smart breeze blowing through a case from an open window will be sure to cause havoc, and perhaps occasion injury that it will require months of extra care to repair. Those who attend to their ferns constantly will discover the happy medium, and attain to complete success; those who are fitful and intermittent, will perhaps stifle their pets for a month at a time, and then suffer them to be blown away, in consequence of a sudden fit for extravagant ventilation.

The giving of water is the most important matter of all. Although the different species vary immensely in their requirements in respect of the most perfect development, yet in practice the same treatment as to water giving, will very nearly suit all alike. The soil should never be quite dry and never be saturated with moisture. In spring and summer more water should be given than in autumn and winter. The supplies should be regularly increased as summer advances up to about the middle of July, and then be regularly diminished. Our cases are commonly left without water, either over the fronds or at the roots, for three or four weeks at a time in winter with evident benefit, but as soon as growth commences freely in the spring we give water frequently, and then begin to use the syringe. Now it is well known that frequent sprinkling of the fronds of ferns is beneficial; it not only aids the growth directly, but it causes the diffusion of watery vapour in the atmosphere of the case, and, as a rule, ferns only attain to perfection in an atmosphere more humid than flowering plants require. There are, however, a few species which are scarcely benefitted by periodical showers overhead, and the adiantums are notable examples, for oftentimes the fronds of maiden-hair ferns are seriously injured by excess of moisture. Here again, we come to a point which the cultivator must settle by observation and experience. In cold weather the syringe should not be used at all. In a case containing adiantums only it should never be used, but in mixed collections, the adiantums and others that are susceptible of injury through the application of water overhead must take their chance. A very small shower goes a great way, and therefore the cultivator will soon learn to be cautious and moderate. One more remark on this subject must be made. Cold water, that is, river and rain water as it

comes to hand, may be used from May to August, but from September to April the water should be tepid. This is a matter of great importance, as will be seen by those who take a real and constant interest in fireside fern-culture.

Under the best of management accidents will happen. One of the most likely, and one from which the most experienced cannot be entirely secured, is the accumulation of an excess of water in the soil. It is a common defect of fern-cases that they allow no escape for excess of moisture, but there ought in every instance to be some provision to render it impossible for the soil to become water-logged. But how will you know when this dreadful event has occurred? The ferns will tell you in unmistakeable language, for fronds that should be green will become yellow; there will be patches of decay, and some of the more delicate-habited species will cease to throw up fronds, and if examined will be found to be decaying in the centre. The safest remedy is to take the whole affair to pieces, remove the sour soil, and begin afresh. Lay down a good bed of broken flower-pots, or large cinders, or broken charcoal; then put on a thin layer of moss or the coarsest cocoa-nut-fibre refuse, and finish with a bed of the proper soil, piling it up as much as may be consistent with good taste, both to increase the depth for the plants and to raise them as much as possible above the drainage.

Insects rarely prey on ferns, but they will appear occasionally. In spring the tender rising fronds may be beset with green aphis, and in summer the more injurious thrips will perhaps appear. Judicious ventilation and watering are the best preventives, but once lodged, the eradication of these insects is not an easy matter. To fill the case with tobacco smoke until not a leaf can be seen, and keep it closely shut and every crevice covered with a damp cloth for several hours, will certainly make an end of the vermin, but then it is the very thing that in the majority of instances cannot be done. The next best nostrum is the vapour of turpentine. Place a little spirits of turpentine in an open vessel which can be kept warm for an hour or two, and shut it up in the case for six hours. A simple mode of creating a turpentine vapour is to fix a small empty flower-pot in the centre of the case; then to make a flat-iron hot, and stand it on the flower-pot, and occasionally paint the iron with the turpentine by means of a brush. With patience and perseverance, however, mechanical methods will be found sufficient. The insects can be removed by means of a camel's-hair pencil, and the fronds that are most disfigured may be cut off and burned. The beginner will no doubt have to deal with insects,

but the adept will rarely see them, for good cultivation will keep them at a distance.

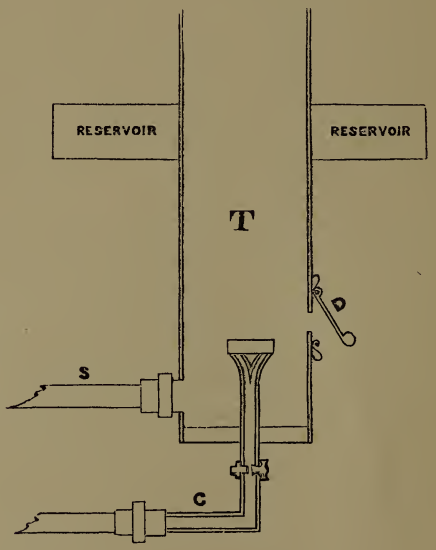
Cases that are kept furnished by means of plants in pots will of course demand the aid of pits and greenhouses, if a frequent change and a rich effect is at all times desired. It is only by this method that any variety of flowers can be displayed in a plant-case, yet it will often happen that a hall or boudoir may be by the adoption of this system kept delightfully gay, and all kinds of flowering plants will endure the confinement for two or three weeks while at their best without harm, if reasonably cared for. A bed of green moss or of quite new cocoa-nut-fibre refuse will suffice for the groundwork, and to hide the pots. When the cocoa-nut fibre has been some time in use, it must be changed, because its fine brown colour, which affords a charming relief to green leaves and flowers, will disappear. The moss will keep green a great length of time, and indeed will grow, and soon after every disturbance produce a fresh green surface. The Crystal Palace Fernery figured at page 84 would make a noble adornment to an entrance-hall if kept richly furnished with plants in pots.

Our friend Mr. H. D. Crossley thus describes a method he has adopted of heating a case by means of a gas flame. A tin tube (lapped joint not soldered) marked T in sketch, stands in the corner, perfectly out of sight to any ordinary observer looking into the case from the room. Passing through a brass bottom, a small gas-pipe enters the tube, supporting a six-hole argand burner. A bat's-wing or fish-tail burner will not answer, as the wide flames impinge against the side of the thin tin tube, and have a tendency to destroy it. The small door D is to close the aperture through which the gas is lighted, and the pipe S is carried out through the frame into the open air to supply the burner with air to support the combustion. Be sure it is a tolerable size, for when the gas is full on much air is required to support a clear steady flame, and to prevent smoke. The gas passes through the pipe G, carried also into the open air through frame of case.

The heat thus engendered is of course too dry for the proper development of ferns. Therefore arrange two pans, holding about a quart of water each, on the tin tube, and by keeping them filled with water each morning, a nice moist temperature can be preserved through the day. If a sharp frosty night occurs, fill up the reservoirs again at night, and by keeping a very small body of flame, which can be regulated to the greatest nicety, the likelihood of the ferns being injured by the frost is reduced to a minimum.

There is no unpleasant odour of vitiated air. The consumption of gas will make little difference in the demands of the gas collector. It is important to remember, that the top of the tube in which the gas is burning, must be carried through the top of the case, otherwise smoke as well as moist air will fill the fernery.

The tube is about six and a half inches in circumference. The reservoirs *two inches* deep, and twenty inches apart on the tube, and can be soldered on, as the water prevents the solder melting. The reservoirs are triangular, so as to fit in a corner, but round, or any shape, will answer.



A SELECTION OF FIFTY FERNS FOR CASES THAT ARE NOT HEATED.

The following selection includes such kinds only as can be grown in cases without heat; but as a few of those named will be injured by frost, it will be well to protect the case with a woollen cover during the night in frosty weather.

British Ferns.—The true Maiden-hair fern, *Adiantum capillus-veneris*, is compact in growth, very beautiful, and in every way suitable for closed cases. *Asplenium adiantum-nigrum* and *A. trichomanes* are both very dwarf, and prefer a dry position; therefore, they should be planted upon the most prominent

points of the rockery. The Sea Spleenwort, *A. marinum*, though hardy, never presents such a beautiful appearance as when grown under glass. We pass over the beautiful varieties of the male and female ferns because of their deciduous character and want of beauty during the winter months. The Welsh Polypody, *Polypodium vulgare Cambricum*, and the Irish Polypody, *P. vulgare semilacerum*, are both first-rate in every respect, but the good old English Polypody, *P. vulgare*, is not to be despised. *Polystichum angulare cristatum*, *P. a. grandidens*, *P. a. plumosum*, and *P. a. proliferum Wollastoni* are all elegant in habit, and have the desirable qualification of a hardy constitution. The strap-like leaves of the Scolopendriums contrast well with the light feathery fronds of the preceding, and must not be passed over. Of these select *S. vulgare crispum*, *S. v. laceratum* (*endivæfolium*,) *S. v. marginatum*, *S. v. ramosum*.

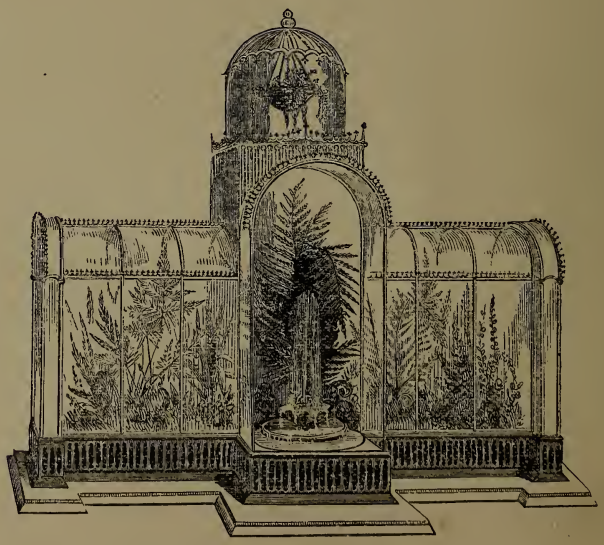
Exotic Ferns.—*Adiantum Æthiopicum*, *A. assimile*, *A. cuneatum*, *A. formosum*, *A. hispidulum*, *A. pedatum*, are all beautiful, but they must not be wetted overhead more than can be helped. *Asplenium bulbiferum*, *A. fæniculaceum*, *A. palmatum*,—these are all of free growth and remarkably beautiful. *Cyrtomium falcatum* is rather coarse in comparison with those previously named, but it is so bold and distinct in character that it cannot be omitted. *Davallia Canariensis*, *D. Novæ-Zealandiæ*, and *B. tenuifolia* are suitable either for planting with the others or for suspending in small ornamental baskets from the roof. *Doodia aspera*, *D. caudata*, *D. rupestris*, are all of humble growth and very beautiful. *Lastrea opaca*, and *L. Standishi* are good. *Todea superba* is one of the most beautiful ferns in existence, and especially good for growing in dark positions; it should have a case to itself, which must be kept closed, and the fronds frequently sprinkled with soft water. *Lomaria blechnoides*, *Lygodium palmatum*, *L. scandens*, *Nephrodium molle corymbiferum*, *Nephrolepis exaltata*, *Onoclea sensibilis*, *Platycerium alcicorne*, *Polypodium plumosum*, *P. pulvinatum*, *Polystichum acrostichoides*, *P. setosum*, *Pteris cretica albo-lineata*, *P. scaberula*, *P. serrulata cristata:* all possess the desirable qualities of an elegant and graceful habit, and grow freely with ordinary management. The two best Selaginellas for carpeting the case are *S. denticulata* and *S. involvens*. *S. apoda* grows freely in a case, but is liable to mildew and decay in a confined atmosphere during the winter.

A SELECTION OF ORCHIDS FOR CASES THAT ARE NOT HEATED.

The most suitable orchids for unheated cases are *Barkeria Skinneri*, *Cattleya citrina* (this should be secured to a block of wood—cork is the most suitable

—and suspended with the foliage downwards,) *Cypripedium insigne*, *C. venustum*, *Epidendrum vitellinum*, *Lælia albida*, *Lycaste Skinneri*, *Odontoglossum grande*, *O. pulchellum*, *Oncidium bifolium*, *O. ornithorhynchum*, *Pleione humile*, *P. lagenaria*, *Stanhopea oculata*, *S. tigrina*, and *Zygopetalum Mackayi*.

The plants should be potted in a mixture of sphagnum and peat, the pots being half filled with crocks. Place the case in a window facing as much towards the south as possible, and throw some thin material over the case when the sun is shining brightly, to prevent its burning the foliage. The shading must be thin to admit the warmth from the sun, especially during the early part of the summer, when the plants are making fresh growth. After the middle of August, expose freely to the light, to ensure the young growth being well matured, otherwise the plants will not flower freely. A rather liberal supply of water will be necessary during the summer, when the plants are growing vigorously; but when at rest through the winter, only sufficient must be supplied to prevent the leaves flagging. The case must be sufficiently ventilated to maintain a pure atmosphere; but the air must be admitted carefully, and mild weather should be selected for air-giving.



FERN-CASE FOR ENTRANCE HALL OR CORRIDOR.

THE BALCONY AND WINDOW GARDEN.

See, light darts down from heaven,
  And enters where it may;
The eyes of all the people
  Are cheered with one bright day.
And let the mind's true sunshine
  Be spread o'er earth as free,
And fill the souls of men
  As the waters fill the sea.

FROM THE GERMAN.

CHAPTER I.

TOWN BALCONIES.

LOMELY recreations, in common with all other pleasures, are capable of abuse, and it may be well, now we are to consider about

the embellishment of windows, to offer a kindly warning to all who read this book. The cultivation of the aquarium, the fern-case, and the formation of a window garden, may jointly and severally operate to the ruin of a household by excluding from it the light of heaven and the common atmosphere. A defect of daylight is as likely to tell, slowly perhaps, but surely, upon the health of the inhabitants of a house as a poisonous atmosphere or insufficiency of food. The obstruction of the daylight, therefore, is in itself an evil, and every instance in which it is contemplated to occupy any considerable portion of a window with an object that will exclude the light from the room should be considered with reference to the health of the family first, as of the utmost importance. Generally speaking, exclusion of light necessitates also exclusion of air, the window that is blocked up ceases to be a ventilator, and the chamber it should illuminate and sweeten becomes altogether unfit for occupation by human beings. The value of fresh air is perhaps sufficiently understood, but it is otherwise as regards the value of light. Photography compels us daily to observe the effects of the subtle powers of light in rapidly changing the colours of certain chemical preparations, yet we are slow to learn that the blanched cheek and trembling hand oftentimes represent debility induced by dwelling in darkness. The ruddy hue of health was never known to warm the cheeks of habitual dwellers in-doors, or of those shut up to sedentary employments, or such as breathe constantly a vitiated air. It is next to impossible to have abundance of light without having plenty of air also as a corollary, and both are primary essentials of health and cheerfulness, more especially to such as are much within doors. We have known instances of injury through undue indulgence in the tastes of which this work is intended to be the exponent, and we cannot proceed further without offering this brief word of caution against riding this particular class of hobbies too fast and too far.

Window gardens of all kinds belong to the town much more than to the country. Even an invalid shut up in one room in a country house, can scarcely need a window garden; for the bleakest prospect will have its changes and its cheerful seasons, and our rural scenery is usually fresh and bright, and permanently interesting. Let each determine the particular case, while we deal with the subject broadly, and with a view to many practical suggestions.

The design at the head of this chapter represents a balcony garden at the town house of a friend, who cultivates with much skill and success a number of interesting plants under circumstances that would deter many from the

attempt. The windows look out on a small enclosed garden, consisting only of grass turf and a few trees: the houses beyond being happily screened out of view, by the nave and tower of a close adjoining church. Along the contracted garden front a narrow terrace has been formed, with steps at each end for access to the little garden below. This terrace is enclosed with a rustic balustrade of iron-work which is painted a warm brown colour, in admirable imitation of wood. Between the windows, wire trellises fill up the wall spaces, and on each side of the length of the terrace, that is, next the wall spaces and next the balustrade, are wooden boxes, very neatly and strongly made, and finished with rustic mouldings. The balcony thus formed is paved with common red foot-tiles, which are always clean and agreeable in appearance, and retain so little moisture that a delicate foot may tread upon them safely very shortly after the falling of a shower.

There is no magic in the arrangements to ensure success; but constant care secures the possessor of this window garden a succession of delights, and to the appearance of the house the distinguishing characteristics of neatness, elegance, and warmth. On the trellises are trained the Virginian creeper, Pyracantha, the common Aristolochia, and *Kerria Japonica*. These four plants are the very best, save and except the ivies, for training permanently to the walls of town houses. In May a few fast-growing flowering plants, such as the climbing *Cobæa*, *Mikania*, and *Lophospermum*, are planted and trained up between the principal shoots of the permanent occupants of the trellis; these flower in July and August, and are then most welcome. Nearly all the plants employed to fill the boxes next the balustrade are trailers of gay appearance; but at intervals throughout a few ivies have permanent places, to afford tufts of refreshing green during the winter. Amongst the favourites for the summer display are Tropæolums, Eccremocarpus, Maurandya, Ivy-leaved Geraniums, and Fuchsias, all these being annually purchased for the purpose, as there are no conveniences for raising the plants or for keeping those of perennial character through the winter. When the flowering season is over they are quickly removed, and a few of the choicest hardy evergreen shrubs are planted in their place, and the tufts of ivy, which are in part trained up and in part suffered to trail down, then contribute very materially to brighten the scene.

That balcony gardening is not unworthy of consideration may be determined by a walk at any time through Piccadilly, to mention only one particular locality in London where good examples are to be found. In several instances we see here the common Irish Ivy, and *Aristolochia sipho*, in most vigorous

growth and the best of keeping, contributing most materially to the dignity and warmth of the buildings they adorn. But probably the best effect in this thoroughfare is where the *Virginian creeper* is trained in festoons across an extensive flat frontage, which, without this bold but truly elegant feature, would be bald and tame, but by its aid, especially when the leaves are reddening in autumn, is rendered remarkably pleasing, and in its way worth a note of admiration as one of the lesser lions of London. One of the secrets of success in this kind of gardening is to make a fair measure of its possibilities. It is better to attempt little and succeed than to encourage the "vaulting ambition that o'erleaps itself." Of the ivies there are a score of varieties, at least, that may be turned to account for balconies, and they will patiently endure the starving, the summer drought, and the cutting winter winds to which they must be exposed in town balconies. These and the Virginian creeper will thrive where many other equally free-growing climbers would inevitably fail. A new small-leaved creeper lately introduced will prove invaluable for the balcony, especially if it can be allowed to train itself to brick or stone, for it quickly forms a perfect felt of the most beautiful leafage, and displays in the course of the season a charming succession and variety of colours. The name of this creeper is *Ampelopsis tricuspidata.*

In the management of a balcony garden, one of the chief anxieties of the possessor should be to afford the plants sufficient nourishment. Every reasonable opportunity should be embraced of introducing fresh soil, but not to the great disturbance or injury of the roots of permanent occupants. In every case sound loam should be employed if possible, and means should be provided for the ready escape of surplus water, and also for the regular supply of water in dry weather. As renewal of the soil of a balcony garden is usually inconvenient, and as respects carpeted stairs and the keeping of the house objectionable, recourse may be had to the use of the prepared fertilizing compounds sold by the seedsmen and druggists. We cannot afford space to discuss the merits or properties of these preparations, but it may be useful to remark that they may all be used with perfect safety if used *sparingly* and *frequently*. A thin sprinkling of the material on the surface of the soil may be made at three separate intervals during the growing season, say in April, May, and June. Thenceforward until April again it would be wise to abstain from any further application, except it be to assist plants that flower in autumn, such as chrysanthemums, which, by the way, are admirably adapted for the balcony garden, provided they can be grown elsewhere during the summer, and have places in

the balcony when the geraniums and fuchsias begin to fail. The chrysanthemums should have a pinch once a month from April to October, and no more. Another mode of employing these refreshers is to dissolve them in the water which is supplied to the roots of the plants. Although they differ in strength, they may all be used with safety and benefit in the proportion of half an ounce to a gallon of water; and as they are comparatively inoffensive, there can scarcely arise any objection to the practice. Let there be provided for balcony uses a vessel large enough for one day's supply, and in this prepare, in the early part of the day, the water which is to be used the same evening. The vessel should stand in the full sun in the open air, and if the water becomes warm in consequence so much the better for the plants, which, so fed, will glisten with health, and grow with delightful vigour.

Yet one more remark on management. It would be a grand thing for the plants if they were treated to a shower of pure, soft, almost tepid water, every evening all the summer long. Water holding in solution any kind of manure should not be used for this purpose, though accidental splashing of the leaves with *very weak* liquid manure will never do harm. But it rarely happens that it is possible to play an engine over the plants in a balcony garden,—it may be that windows on one side, and pedestrians on the other, are to be considered as rendering the practice inadvisable. Well, every case must be determined on its merits. Something may be done perhaps by means of a hand syringe, and if only a slight dewing by means of a fine shower can be given daily, the results will repay the trouble a hundredfold. In very hot weather, water should be given twice a day, if possible. If that is not possible, once a day must suffice, and will be more beneficial in the evening than in the morning. To give water while the sun shines fiercely will be to risk the safety of the whole affair.

In cases where the owner of a balcony wishes to make the utmost of it in the delightful pursuit of plant collecting, a rockwork may be added with advantage. We have hundreds of fine subjects amongst the Alpine and succulent-leaved plants that are admirably adapted for the balcony garden, as a large selection can be grown in little space, and with a minimum amount of skill or trouble. All that we shall name will thrive in either a shady or sunny position, and, excepting in the hottest part of the year, require no water, and even then once or twice a week will be quite sufficient under ordinary circumstances. A small rockery upon which to grow succulent plants may be erected on each side of the window, or at each end of the balcony, and, as it is useless to attempt an imitation of Alpine scenery in the limited

space at disposal, a simple undulating surface only should be aimed at. Place a layer of brickbats on the floor to form a drainage and carry off the water quickly, then place a layer of light sandy soil about a foot in thickness over these, and a few large burrs along the front to keep it in its place. When the work has progressed thus far, take a few rustic-looking pieces of burr or stone, stand them on the surface, and fill the interstices with soil, so as to leave the points of the material used visible. It is a very common mistake to call in the bricklayer and erect an elaborate rockery, with little or no provision for placing the soil in which the plants are to be grown; but with the simple arrangement here advised, the body of soil will be sufficiently ample for all purposes. When everything is in readiness, insert the plants between the crevices; and if any are taken out of pots, reduce the ball of soil and carefully separate the roots, and in planting (whether from pots or not) see that a little soil is placed between the roots and the roc work. Very little attention will be necessary after the planting is completed, but from the end of May until the end of August the soil should not be allowed to become quite dry, although the plants will not take much harm if they suffer neglect occasionally.

Having pointed out the best and most simple way of constructing the rockery, it will be a very easy matter to name a few plants suitable for growing upon it. The most prominent points should be taken advantage of for planting the several members of the houseleek family, and of these the most beautiful and distinct are *Sempervivum arachnoideum*, *S. Californicum*, *S. ciliatum*, *S. globiferum*, *S. hirtum*, *S. montanum*, *S. pyramidale*, *S. soboliferum*, and *S. tectorum*. For planting between these, nothing can surpass the thymes, stonecrops, and saxifragas. The former soon form huge tufts of vegetation, and must be kept in subjection by an occasional cutting back. *Thymus corsicus*, *T. lanuginosus*, and *T. serpyllum album* are the most distinct in character. The saxifragas are remarkable for the dense tufts of moss-like verdure they so quickly form in positions the most unsuitable to vegetable life. *S. aizoon*, *S. androsacea*, *S. cæspitosa*, *S. cochlearia*, *S. hirta*, *S. hypnoides*, *S. incurviflora*, *S. longiflora*, *S. pedata*, *S. pygmea*, and *S. reticulata* are all good. The best stonecrops for carpeting the surface are *Sedum acre aureum*, *S. aziodeum*, *S. glaucum*, *S. Hispanicum*, and *S. sempervivoides*. A few stronger kinds may be added, such as *S. atropurpurcum*, *S. fabarium*, *S. Japonicum*, *S. purpurcum*, and *S. Sieboldi*. These are more suitable for planting in the lower parts of the rockery, where they will have the advantage of a greater body of soil than they would have in more prominent positions.

CHAPTER II.

ENCLOSED WINDOW GARDENS.

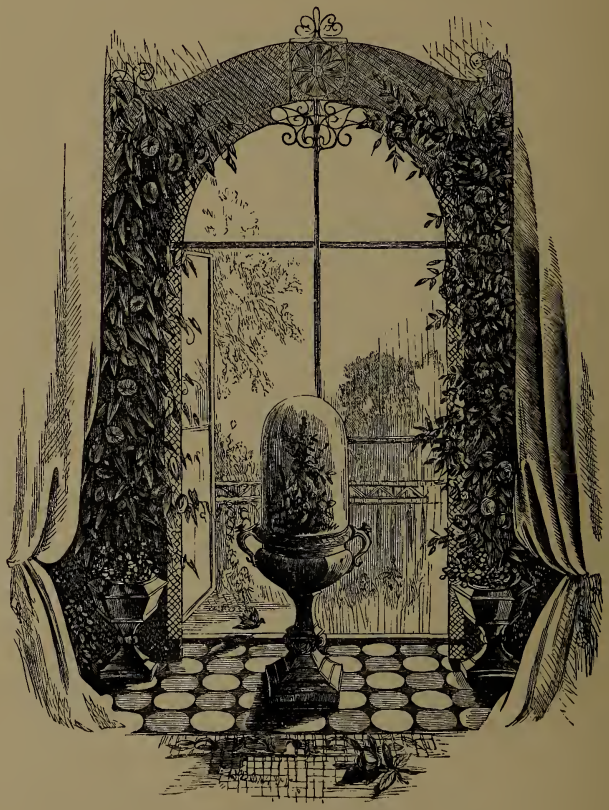
Mild-breathing Zephyr, father of the spring,
Who in the verdant meads doth reign sole king,
Who, sheltered here, shrunk from the wintry day,
And careless sleep the stormy hours away,
Hath roused himself, and shook his feathers, wet
With purple-swelling odours, and hath let
The sweet and fruitful dew fall on this ground,
To force out all the flowers that might be found.

BEN JONSON.

O adapt the fern-case and the aquarium to the window is by no means a difficult matter, and may oftentimes be most desirable, for though windows are useful usually to permit of a view and afford ingress for light and air, occasions occur in which light and air may be partly spared, and the view must be blotted out by something better. As speech may be employed to conceal as well as to publish thoughts, so windows may be sometimes increased in value when occupied with objects that render them useless for their ordinary purposes.

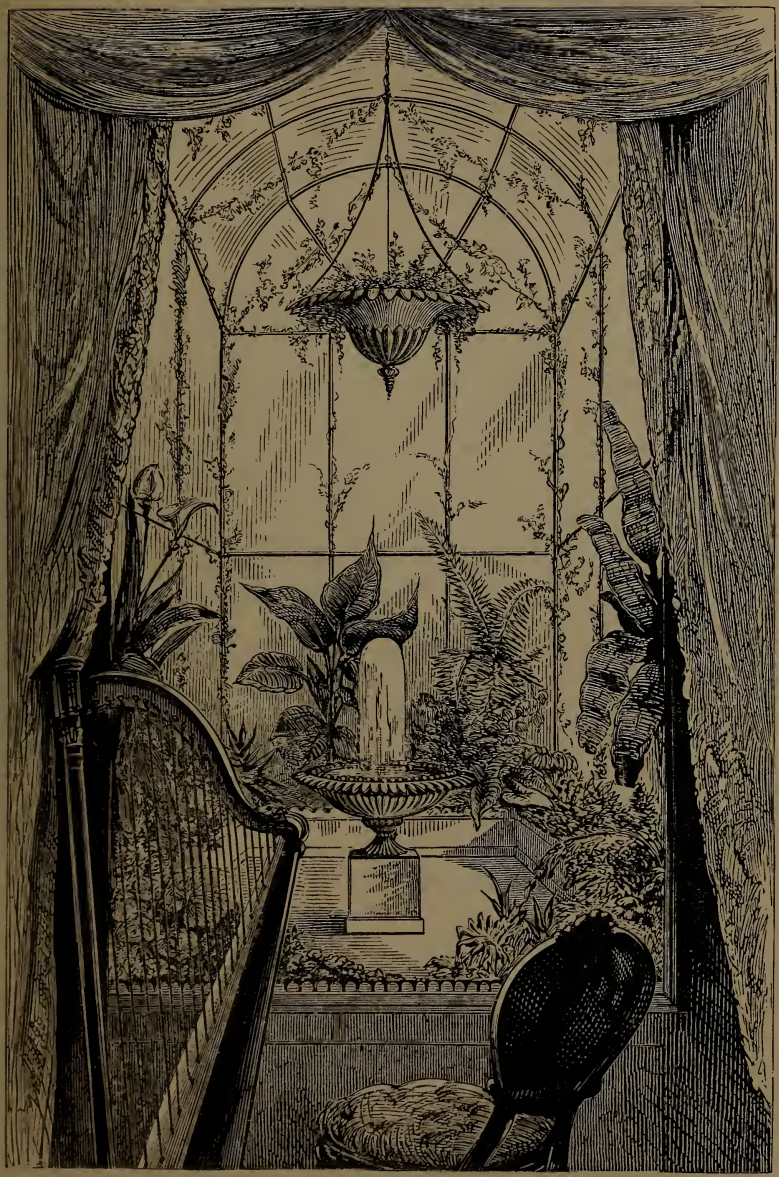
Where a house stands amidst its own grounds, there may not be much need of a floral display at the windows; but in suburban villas the views are not always of the finest, and besides the opportunity the window offers for flower culture, it is sometimes advisable to shut out the glances of too curious eyes, and screen ourselves from the glare of the sun, the driving dust, the keen wind in spring, when the blue sky and inviting greenness tempt us to throw up the sash in spite of the lingering north-east; in fact, a bowery window is often desirable for strict utility, as well as for ornament; and nothing is easier than to break the angular outlines with plants, and create a choice garden within and without, such at least as may give a lady full employment, and add vastly to the grace and pleasure of the home.

The shape, dimensions, and aspect of a window will, of course, pretty much determine what is to be done with it. To begin inside, you may, if there is



A Boudoir Garden.

sufficient space, and particularly where a large bay window offers the opportunity, place at each side a neat box lined with lead, and of a depth proportionate to the height of the window-sill. Twenty inches may be considered a good depth; and each box should occupy not more than a third of the window, so as to



A DRAWING-ROOM CONSERVATORY.

leave the central space open for the view and the transmission of unbroken light. Then in each box fix a trellis of wood or wire—and wire is *always best*—to ascend nearly to the top of the glass, and then arch over and meet in the centre. Indeed the centre-piece should be made separately, so as to admit of removal in winter, if desirable, and it may be attached to the two side portions by a little simple carpentering. Most of the climbers require to be shortened in autumn, and the few rods left must be well ripened by the plentiful admission of light and air; and when this is accomplished the upper portion forming the arch of the trellis may be removed, to give full access to the winter light, which is, heaven knows, scanty enough in our climate. These boxes, if fully exposed to the daylight, may be stocked with choice half-hardy plants, which, having the shelter of the room in cold weather, will do as well there as in a greenhouse. Against the trellis may be planted a few tender climbers, such as you cannot well grow outside, and which are of quick growth and light in leafage. In Paris the common ivy is often grown in this way, and is well adapted to the purpose; so also is the Japanese honeysuckle, the leaves of which are most beautifully reticulated. I have eaten many a fine bunch of grapes grown in this way, but the root was usually outside, and the rods brought in and trellised over the window greenhouse fashion; and a lovely spectacle it makes as we catch the daylight through the emerald green of its noble leaves. Indeed, plants seen thus *against* the light have the most charming appearance possible; every vein and pore is visible as the light streams through them, and on the room the light falls beautifully tinted with a soft green, and chequered with a thousand interlacing shadows.

A grand development of the foregoing simple plans is accomplished by the construction of a miniature conservatory opening from a large window or a pair of glass doors, these being made so as to allow of their removal during the summer, when the lintels can be dressed with drapery to give an artistic finish to the whole affair. The aspect must determine the selection of plants for the purpose. If shady, ferns will thrive if carefully tended. If the aspect is due south and the sun plays for many hours with full force upon the glass, a number of most noble plants become instantly available, such as Agaves, Aloes, Yuccas, Bonaparteas, the tree Houseleek, (*Sempervivum arboreum*,) Dracænas, Crotons, and a number of small succulent plants, of which we may take the curious *Pachiphyton bracteatum* as an example. Flowering plants of many kinds may of course be used abundantly, but generally speaking it is unwise to attempt to keep them in these small structures; they should be

A PEEP AT A TOWN GARDEN.

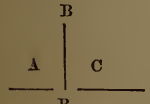
brought in when at their best, and be taken back to the frame or greenhouse when beginning to wane. To add a fountain is an easy matter if there is a sufficient supply of water from a higher level, and if there is not, a supply sufficient for playing the fountain occasionally may be obtained for comparatively little expense. A small cistern in one of the upper rooms or outside the house should be fixed where it can be conveniently filled as required. A lead pipe of small bore will convey the water to the fountain, and there a little evident engineering will accomplish the rest. As the splashing of water in such a place might be objectionable, the fountain may be enclosed in a glass shade, and its appearance rendered none the less elegant thereby.

When visiting Mr. Hay at New Cross lately to see his beautiful spergula lawn, we were greatly entertained for an hour in one of the prettiest "annex" conservatories we have ever seen. A chamber placed below the level of the sitting rooms, and what appeared to have been once on a time a sort of supplementary cellar, were converted into a fernery, lighted solely from above. The floor was red tile, the walls were clothed with rockwork made of "burrs" from the brick-kiln, and there were arches of the same material forming a sort of vista, which gave a spacious air to a very small place. The pillars, arches, and walls, were richly clothed with ferns and mosses, all in the most delightful state of perfection. This fernery was seen from one of the rooms above, but was not accessible directly from that room, because of the probability of mischief from damp. A narrow passage to intercept the humidity led to the fernery, and this passage was furnished with plants, forming a sort of ante-garden. A surprise for the visitor had been obtained by piercing the wall of this passage, and inserting therein an oval glass window, which increased the light, afforded ventilation, and allowed of a peep into the beautiful garden where the spergula turf made a carpet so soft and green, and dense and felt-like, that to compare it with any textile fabric would be to compare Hyperion to a satyr. The ante-garden and the window are represented on page 95.

Another development of the enclosed window garden is that particular form which, some years ago, we designated the *Hortus fenestralis*, the window garden *par excellence*, and the *multum in parvo* of its kind. It is an elegance peculiarly adapted for the window that commands an unpleasant look-out, or where inquisitive eyes impose a limit on privacy, or perhaps tongues that defy propriety make unseemly noises without. It is powerful to exclude noise, dust, and excess of light; and may be made a gratification to passers-by, as well as to those within the house, as may be desired.

An essential feature of the *Hortus fenestralis*, is that it is in the fashion of a closed case fitted to the window, extending to half its height or more; it may indeed be of the same height as the window, and projecting outwards to the full extent of the sill or beyond it. If the reader will turn to any one of the windows of the apartments occupied during the perusal of this, it will be seen that there is a space both within and without the glass sashes that

may be appropriated for the cultivation of plants, as the annexed diagram will illustrate. Let A represent the inner sill, B the existing glass sashes, and C the outer sill. The whole width of A and C may be appropriated to plants by providing a glass case to fit it: and as most windows consist of two sashes, the lower sash may be removed and its place be taken by the case; or if that is objectionable, the space C may be appropriated to the case, which may be allowed to project



a little beyond the actual width of C in order to gain a sufficient depth for a good effect. Where the windows are large, and there is no objection to a considerable projection, two feet depth may be considered liberal for the *Hortus*

fenestralis; its width and height will be determined by the window. The next business is to fit it. It is well if the base be made of one stout slab of slate or stone, the joints may be iron, and the lower sash of the window may be made to serve as its inner side, and the means of access to it. Any skilled worker in glass and metals could fit up a case if furnished with such a design as the employer would approve of, and we will only remark that every part of

the workmanship must be good, and there ought to be about the whole affair an elegance of finish consistent with its purpose.

Let us suppose we have a window to deal with. It is perhaps a window of comparatively little use to afford either light or air, and mayhap has been washed with some preparation to render it nearly opaque. A cheerful display of greenery would be far preferable to a window that looks like a great sheet of dirty paper marked with lines dividing it into squares. We remove the lower sash, or we take out both the sashes, and construct as deep a case as inner and outer sills admit of, and perhaps a little more than the width of the sill on the outside. There must be escape for water from the bottom of the case, and there ought to be six inches depth enclosed by a moulding round the base, in which to place the soil in which the plants are to be grown. Over the bottom should be strewed a layer of broken bricks, of the size of walnuts, and over that a mixture to be made as follows. Take of turfy peat, chopped or torn to the size of walnuts, without the dust resulting from the operation; three parts of this peat, with one part silver sand, and one part bricks broken almost to the size of peas, would form a compost in which any plant adapted for the case would grow to perfection. A much greater depth of soil than the six inches allowed for in the construction of the case, can be obtained by constructing a miniature rockery, and so heaping up the soil towards the centre between the stones of which the rockery is formed. The best stone for the purpose is soft sandstone, but common coke will do if there is any difficulty; or picked pieces from the "burrs" used in garden rockeries will do very well, as they soon become mossy, and plants grow well amongst them.

As a rule, there are no plants to equal ferns for these cases, and as they will afford more space for them to grow than ordinary fern-cases, some species of large size may be introduced. It will be understood, however, that a sunny south window is not the place for ferns; there, indeed, another course must be pursued. As a rule, it will not be possible to heat these window gardens, though in some instances, no doubt, hot water will be made to circulate around and beneath them, for their protection during cold weather. But when not so aided, the hardier kinds of ferns should alone be planted in them. Ferns that are adapted for cool houses and cool cases are just such as are required here.

One form of case combines an aquarium with a fernery. Here the lower half or a third of the window space should be blocked with a slate slab, which forms the back of the tank, the glass front being within the room. It has been shown in the chapters on the aquarium that it is not generally advisable

to allow the light to stream through a tank, and therefore an opaque back is preferable to glass. In furnishing a case of this description, the common English ivy, *Hedera helix*, in the normal condition in which we usually find it in hedgerows, would be most valuable, as it thrives in closed cases and can be trained up to form a most elegant green tracery. Those beautiful climbing ferns, *Lygodium scandens*, and *Lygodium Japonica*, are also well adapted for the same purpose, and must have copper wires fitted to train them to. But here is a golden opportunity for growing the lovely filmy ferns, such as *Trichomanes radicans* and *Hymenophyllum Tunbridgense*, with other moisture-loving kinds, such as *Asplenium fontanum*, and many of the larger varieties of mosses met with in bogs and the neighbourhood of fountains. As to the aquarium it is advisable to introduce small fishes only, and those should be varieties of carp, the gold carp being the most generally useful. To every two gallons capacity of the tank one small carp may be allowed, and no more. The water should never be changed unless some accident renders it necessary to clean out the tank, and cleanse it thoroughly. All snails, and in fact all the small animals commonly used as "scavengers," are best dispensed with; they are simply a nuisance. It is also a fallacy to introduce water-plants, but *Vallisneria spiralis* is an exception, as it generally thrives if planted in a bed of pebbles, and left undisturbed. In every part of the rock, and the sides of the aquarium, confervæ should be allowed to grow, but the front glass, through which the view is obtained, must be kept quite clean by the occasional use of a sponge firmly fixed to a stick. As a matter of course the front glass of the upper part should open as a door, and there should be permanent ventilation provided above.

Where sunny windows are fitted with cases, and a gay display of flowers is required, it will be advisable to introduce plants in pots, and plunge them to the rim in cocoa-nut fibre or moss, and change them frequently as they go out of flower, for others in full prime.

As we have kept in mind the importance of light and air, we must not here forget that conservatories that are approached through dwelling-rooms are apt to communicate to those rooms more atmospheric moisture than is desirable. Therefore protection against damp must be thought of in time. One great safeguard is to establish an intermediate apartment, through which the conservatory can be seen as well as approached. This, however, is only possible in certain peculiar instances. But a coating of Portland cement on all the walls of the dwelling that abut on the conservatory will most effectually prevent

transmission of moisture through the walls, and a careful use of water amongst the plants will keep evaporation at a minimum. Succulent plants need so little water at the root, and thrive so well in a dry atmosphere, and, moreover, are so much benefitted by free ventilation in summer time, that they are the very best of subjects for an annex of the kind figured at page 97. Palms will bear privations better than is commonly believed; and a number of flowering plants may be kept in health for a short time on small allowances of water, provided they are never allowed to become quite dry. Another help towards counteracting humidity is to have the plants staged on an open trellis, and beneath this a zinc tray, continued all round, and communicating with an outlet for the quick conveyance of every drop of water that runs through the pots in watering.

A SELECTION OF PLANTS ADAPTED FOR ENCLOSED WINDOW GARDENS.

Agave Americana, A. Americana fol. var., A. applanata, A. cœrulescens, A. filifera, A Schidigera, A. dasylirioides, A. Verschaffelti.
Aloe plicatilis, A. serrulata.
Aralia leptophylla, A. palmata, A. papyrifera, A. quinquefolia, A. reticulata.
Araucaria Bidwilli, A. Cooki, A. Cunninghami, A excelsa.
Arundo donax variegata.
Aspidistra lurida variegata.
Bambusa Fortunei variegata.
Beaucarnea recurvata.
Dammara Browni, D. Moorei.
Dracæna Australis, D. fragrantissima, D. indivisa, D. nutans, D. Veitchi.
Echeveria metallica.
Farfugium grande.
Ficus elasticus, F. Chauvieri, F. Porteana.
Grevillea Drummondi, G. elegans, G. robusta.
Hydrangea Japonica variegata.
Isolepis gracilis.
Lomatia elegantissima, L. ferruginea.
Osmanthus ilicifolius aureus variegatus.
Phormium tenax, P. tenax variegatum.

Rhopala Australis, R. corcovadensis, R. Porteana.
Saxifraga Fortunei, S. sarmentosa.
Sedum carneum variegatum, S. Sieboldi variegatum.
Veronica Andersoni variegata.
Yucca aloifolia variegata, Y. filamentosa variegata, Y. quadricolor.

In addition to the foregoing plants, the following Palms succeed well in window cases if protected from frost in winter: —

Areca Baueri, A. lutescens, A. sapida.
Brahea calcarea.
Chamœrops excelsa, C. Fortunei, C. humilis, C. palmetto, C. sinensis.
Cocos Australis, C. Bonnetti, C. Chiliensis.
Corypha Australis.
Latania Borbonica.
Phœnix dactylifera, P. humilis, P. sylvestris.
Raphis flabelliformis, R. flabelliformis fol. var.
Sabal Adansoni, S. Moccini.
Seaforthia elegans.
Thrinax parviflora, T. tunicata.
Trithrinax mauritiæformis.

Flowering plants of many kinds may be introduced from time to time, to light up the collection and afford agreeable changes.

CHAPTER III.

THE WINDOW-SILL AND THE AREA.

I would not for a world of gold,
That nature's lovely face should tire:
Fountains of blessings yet untold,
Pure source of intellectual fire:
Fancy's pure buds, the germs of song,
Unquickened 'midst the world's rude strife,
Shall sweet retirement render strong,
And morning silence bring to life.

BLOOMFIELD.

ET us not despise the day of small things. A window-sill garden is better than no garden, and the dark area where cats quarrel and damp makes patches of unsightly mould, may be made bright with healthy vegetation that shall be worth a little care and very much love. One advantage of abstaining from the adoption of a glass enclosure is that we may have flowers at the windows without losing a ray of light, and with additional temptations to open the window that the healthy breeze may wander round the room, and bless the inmates with waftings of odours from our own flowers.

It is a very simple matter to obtain a sufficient number of handsome plants in pots, and place them on a window-sill, and thus produce a fringe of fragrant flowers that shall contribute materially to the comfortable aspect of the house, whether as seen from within or without. But it too often happens that the effect is ephemeral. The plants are perhaps not suitable, though attractive. It may be early spring time, and a bleak east wind blowing. A hawker appears with a gay basket of pelargoniums, cinerarias, and cyclameas, all of which have been rapidly forced into flower in a hothouse, where they have not only been kept very warm, but have been bathed in atmospheric humidity. A purchase is made, and the plants make a bonny show to-day, to-morrow,

and perhaps for one day more, and then it is all over with them; the cold has killed them. Or it may be high summer, and the hawker appears again, and as there is no cold now to fear, another purchase is made. Once more a bonny show, in the blazing sunshine, where the pots become so hot that a tender hand dare not touch them, and in a few days they cease to be, for the heat has killed them. A little judgment is certainly needed to begin well in window gardening, but more needful than judgment is constant care, for where care is exercised the necessities of the plants will be discovered, for they almost speak for themselves, though only those who really take an interest in their welfare will ever discover what they mean by their varying aspects as their fortune changes. Pot plants answer admirably on windows, as every body knows who has made a few commonplace observations, and it may be well to offer a few words upon the conditions that are essential to success. First, we must have a good selection of subjects. Forced flowers are not desirable, and therefore in the early months of the year hardy plants alone should be employed. We may have during winter, and far into spring, neat, bushy, evergreen shrubs, such as *Arbor vitæ*, laurestinus, box, holly, aucuba, ivy, and euonymus; of all these, except the first two, there are several varieties with variegated leaves, which, if intermixed with the dark green kinds, have a beautiful appearance. The sort of window-sill on which a group of these would have the best appearance is one with a broad slab, with heavy ornamental iron-work in front to hide the pots, and prevent them being blown over. The sort of plants best adapted for it are short, compact, roundish bushes; and the best way to place them is to pack them close in three or four rows, the tallest in the centre, and the shorter plants on either side, thus forming a sort of bank as seen both from within and without. For spring a few potted wallflowers, primroses, cytisus, hyacinths, tulips, and crocuses, may be brought forward; and they will look better if a few of the greenest of the evergreens are associated with them than the brighest lot of flowers without any such relief. For summer the zonale pelargoniums (geraniums so-called) will take the lead, both for their brilliancy and their long endurance; but any free-flowering plants will then be available, and will always have the best effect if care is taken to ensure in the mixture a due proportion of green. The autumn will bring asters to make a change, and pompone chrysanthemums to wind up the season of flowers, after which the evergreens will take their place again.

The endeavour must be made to keep all the plants in perfect health as long as possible. To begin with the evergreens: they must have regular

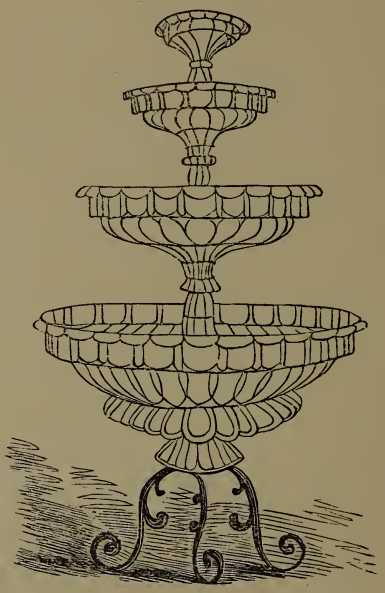
supplies of water, even in rainy weather, for very little rain will ever find its way to their roots. They should never be exposed to severe frost, but a slight freezing of the top crust of soil will do them no harm. During really damp weather they should all be removed, and put aside in any *dry*, *cool* place safe from frost: even if they are in the dark for a week will not much matter, but light is good for them always. A dry hot room is not the place for them at all, better a dark cellar or the roughest shed, and if the place they are taken to is one where long-protracted frost will be sure to find its way, lay them on their sides upon the ground, and put about six inches of dry hay over the pots lightly—no frost will hurt them then.

Equal care must be taken to protect the roots of the plants from injury by excessive heat. It is a good plan with such plants as calceolarias, verbenas, lobelias, and pelargoniums, when placed in the full sun, to drop them into empty pots a trifle larger than the pots they are in, and fill the space between with moss or sawdust: this affords sufficient protection. Of course ornamental pots may be employed for this purpose, and this is always the best way to use them, for it is a bad practice to grow plants in ornamental pots; they should be used merely as receptacles, or they will not last long, and moreover, it is but seldom plants of any kind will grow so well as in the common garden pots that are in use everywhere.

As to watering, an occasional deluge is almost as objectionable as perpetual insufficiency. Give water moderately and regularly; let it be soft, and if not warm, at least not decidedly cold. Large plants in small pots will not continue long in health unless most carefully tended as to watering, and it will usually help them if a mere pinch of some fertilizing substance such as sulphate of ammonia is dissolved in every can of water which is intended for them. As to this matter, see what has been said at page 89. Remove all seeds as fast as they appear, for the bloom soon ceases if seeds are allowed to ripen. Dead leaves must be removed of course.

A well-filled flower-stand may prove an agreeable window ornament, provided it is kept always well furnished with plants in the best of health, but we see some dingy examples at times that are fitting "adornments" only of a house where slovens hold the rule. Lightness and elegance of outline are to be studied in choosing them, and no little care must be exercised to keep them gay at all seasons. It is a folly to suffer plants to pass all their days in such receptacles; their proper use is to exhibit fine specimens of blooming plants; and of these, greenhouse exotics are most suitable. Where a greenhouse is

well managed, there will be no difficulty in furnishing the stand with a succession of fairy roses, geraniums, fuchsias, heaths, genistas, azaleas, camellias, calceolarias, etc.; and it should be the aim of the possessor to preserve the brightness of the scene all through the year. The moment a plant goes out of bloom, it should be removed and its place supplied with another; for as to rearing plants in such situations as many do, it is wasting one of the best opportunities which art affords us for a display of successional pictures. As

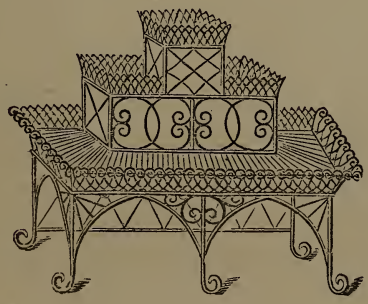


well might the actors dress and rehearse before the audience, as a collection of plants be allowed to present themselves in all their preparatory stages to the eye of either visitor or host.

A flower-stand should always be bright, clean, and gay; and since it is a purely artificial arrangement, it should *in itself* be ornamental in design, material, and colouring. Designs and patterns might here be multiplied without end were they needed, but they are not. A visit to any of the established makers of iron and wire ornaments will enable any one to choose better than

a whole sheet of engravings. Strict *appropriateness* is all that need be thought of (except price) by any purchaser of such a floral necessity. The size, the form, and the general arrangement must be such as to adapt it to the place it is to occupy; and if any special form deserves special notice, it is that which admits of the grouping of other ornaments, such as vases and fern shades with it; and this is easily accomplished—with a stand of an arched form, which admits of additional objects being placed beneath it.

Window flower-boxes are now made in a variety of materials and styles, from the humble trough of deal wood painted stone-colour or dressed with rustic work in the shape of hazel-rods and pine-cones, to the richly coloured encaustic tiles, and the equally beautiful and cheap imitations of them. These



not only make an end of the ugliness and inconvenience of flower pots, but in them the plants grow far more satisfactorily and require considerably less attention. It is quite common now, and let us rejoice that it is common, to see windows most tastefully embellished with these constructions. In one of our regular "constitutional" walks we pass a handsome mansion built of white brick, all the noble windows of which are furnished with boxes of a costly kind, in the colouring of which blue predominates. They are always dashingly kept in flowering plants, and the rich colours of the boxes do not in any way kill out the colours of the plants. And we frequently pass a quiet tradesman's cottage, the windows of which have plain stone-coloured wooden boxes, which are equally satisfactory, because appropriate and well kept. Thus, the purse does not confer on its possessor a monopoly of pleasure any more

than it serves him in place of judgment and taste, and both these instances may be, and we hope they are, outward exponents of the content and peace that prevail within. Hear what Spenser says:—

It is the mind that maketh good or ill,
  That maketh wretched, happy, rich, or poor;
For some that hath abundance at his will,
  Hath not enough, but wants in greater store;
  And other, that hath little, asks no more,
But in that little is both rich and wise;
  For wisdom is most riches; fools therefore
They are which fortune do by vows devise,
Sith each unto himself his life may fortunize.

In the management of window boxes the directions given above for pot plants apply with very few exceptions; they must be prepared with care, in the first instance: a layer of broken flower pots must be put in to ensure perfect

drainage, and then a bed of light rich soil, such as would be employed for growing potted fuchsias, for example. Having had a set of boxes to keep furnished at our own windows for many years past, we have found that though an annual renewal of the soil is desirable, it is not imperatively necessary.

We kept our boxes in fine condition for four years in succession without changing the whole of the soil, but every time they were replanted we removed a little of the top crust, and after planting, filled up with good hot-bed manure rotted to powder. A succession of plants must be provided, for the boxes should be always occupied. Let us sketch out a course in brief. For winter, small bright evergreen shrubs, packed close. When they are planted, pot in the smallest pots possible, a lot of snowdrops, crocuses, hyacinths, and early tulips, but have nothing to do with the narcis, ixia, and other bulbs commonly grown in the greenhouse and garden. About the end of February take out the evergreens with care, and plant them in the garden or pot them, and put them in a frame. Then carefully turn the bulbs out of their pots and plant them very close together in the boxes, arranging them as to their future heights and colours, according to your knowledge of their habits; as a rule, placing the hyacinths and tulips along the centre, and the crocuses and snowdrops along the front and back. There will be a long succession of flowers, for as the snowdrops and crocuses go out of bloom, their leaves will rise and form a green groundwork which will enhance the beauty of the hyacinths and tulips that follow. By the middle of May all these will be over. If you can afford to throw them away, do so, as it is best to plant fresh bulbs purchased from the seedsman every year. If that sacrifice alarms you, place them aslant upon a shady border and cover with earth until their leaves have quite perished, and then store them away. Then plant summer flowering plants, such as pelargoniums, calceolarias, lobelias, fuchsias, and other compact-growing subjects that are gaily coloured, but avoid as a rule, the golden and silver-leaved plants that are used for edging flower beds, for they rarely look well in window boxes. When these begin to fail in autumn take them out, and again, if you can afford to throw them away, do, and save all the trouble of keeping them through the winter. Now you may fill the boxes with asters of all colours mixed; or with pompone chrysanthemums, which, however, are usually too tall to make a pretty display. Then the evergreens come on the scene again, and it may be agreeable to vary the furniture by means of plants which bear red berries, such as skimmias, and until frost actually kills them (as it will,) the large-berried varieties of *Solanum pseudo-capsicum*. Potted plants may be plunged in these boxes, and as there may be in your possession suitable plants which it would not be worth while to turn out of pots, plunge them and wait for the next turn of fortune's wheel. Enough of prose so far; now let a poet, Jacques de Lille, suggest the rule of action:

> You then, to whom their lovely pomp is giv'n,
> Display with art these charming gifts of Heav'n;
> Let every season have their brilliant bloom,
> Their laughing colours, and their rich perfume:
> Let each in turn the well-wrought chaplet wear,
> Thus ne'er shall fade the garland of the year;
> But new-born joys shall every season bring,
> Each month a bower, and ev'ry bower a spring.

For a moment only we will now descend to the lower regions. In perambulating the great city we obtain occasionally a glimpse of a great area which the owner has rescued from the cats and made into a pretty fernery; why should there not be many such subterranean gardens? They are to be preferred to dirty bricks and damp stone, and the scatterings of the scullery, which ofttimes find their way there. It is easy enough if there is a will to give the impulse, yet it may be attempted and prove a failure, and so a few words of advice may profitably occupy a page or so here. In the first place, to guard against damp, the walls should be dressed with a surfacing of cement as high at least as rockwork is to be built, or water splashed. Against the walls rear banks of burrs and sandy peat, and plant thickly with the commonest hardy ferns, such as *Lastrea filix-mas*, *L. dilatatum*, *Scolopendrium vulgare*, *Polypodium vulgare*, *Cyrtomium falcatum*, *Polystichum aculeatum*, and *Athyrium filix-fœmina*. You may be told, perhaps, by some horticultural Solon that ferns will not live in such a position, but never mind that, try it, and success will be certain, unless there is a great blunder at first and utter neglect afterwards. Regular watering both winter and summer must be given, but never a drop while the soil is really moist in winter, nor during frost. From the end of April to the end of September give them a daily shower from a syringe, but never use the syringe in the remaining months of the twelve. Many other plants will grow in such a position with the same treatment. For example, plant in the dampest and shadiest part of the area garden the common "mother of thousands," *Saxifraga sarmentosa*, and it will grow so luxuriantly that those who only know it as a pot plant will be surprised at its beauty. The next step is to cover in the area with glass, which will suit the ferns very well, but may utterly ruin the breakfast-parlour or kitchen that commands the view. Do not take this step therefore without serious consideration of the possible consequences.

Once more, and most briefly. You may wish to grow a few plants or even to make a gay garden, on a roof or some other hot, dry spot, where ferns would soon perish, and greenhouse plants scarcely live. For such a

spot there is a host of subjects available, and chief amongst them certain succulents, such as *Sempervivuus*, *Sedums*, *Yuccas*, *Agaves*, and the curious *Pachiphyton*. Make the drainage secure, provide a bed of good loam, with plenty of sand and broken bricks intermingled, give plenty of water while the plants are growing, and none at all or very little indeed during the season of rest. Where shall we find a spot in which not any plant in the whole world can live? It will be a hard task to find a spot where vegetation is impossible, but if it be found, human life would be endangered by inhabiting it, and so we may take plants of some sort with us wherever we go, and make them the quiet companions of our daily life.

WINDOW PLANTS THAT MAY BE HAD IN FLOWER THROUGHOUT THE YEAR.

JANUARY.—Acacia platyptera, Coronilla glauca, Jasminum nudiflorum, Crocuses, Chinese Primulas, Snowdrops, White Roman Hyacinth, Russian Violets, Mignionette, Cytisus Atleeana, Erica hyemalis, Epacris Delicata Hyacinthiflora, Lady Alice Peel, and Mrs. Pym; Solanum capsicastrum and Wetherill's Hybrid.

FEBRUARY.—Azalea amœna, Fielder's White, Stella, and Chelsoni; Camellia alba plena, Beali, Countess of Ellesmere, Rubens, Teutonia, and Chandleri elegans; Epacris Exquisite, Viscountess Hill, Lord Palmerston, and Lady Panmure; Cyclamen persicum, Hyacinth Laurens Koster, Duke of Wellington, Charles Dickens, Grand Lilas, Amy, Madame Hodgson, Grandeur à Merveille, Grand Vainqueur; Bird of Paradise and Tournesol Tulips.

MARCH.—Azalea Criterion, Flower of the Day, Juliana, and Petunæflora; Camellia Giovanni, Lavinia Maggi, and Saccoi nova; Acacia armata and grandis, Lily of the Valley, Tulip Pottebakker, Gloria solis, and Thomas Moore; Double-flowered Plum, Erica gracilis vernalis and Wilmorena, Geranium Gauntlet, Polygala oppositifolia.

APRIL.—Deutzia gracilis, Cytisus racemosus, Alyssum saxatile, Lachenalia quadricolor, Triteleia uniflora, Camellia Valtevaredo, Marchioness of Exeter, Ochroleuca, and Imbricata; Azalea Eulalie Van Geert, Fascination, Gledstanesi, Lizzie, and Virginalis.

MAY.—Cytisus Everestiana, Lachenalia tricolor, Weigelia rosea, Myrtles, Dielytra spectabilis, Acacia pubescens, Iberis corræfolia, and Kermesina; Cuphea

platycentra, Epacris Eclipse, Salvia gesneræfolia, Azalea Etoile de Gand, Grande Duchesse de Bade, Stanleyana, Perryana, and President Humann; Pelargonium alba multiflora, Crimson King, Desdemona, Ninon de l'Enclos, Blanch Fleur, Dr. André, Empress, Prince Napoleon, Charles Turner, Claudia, Rose Celestial, Lord Clyde and Undine; Hydrangea hortensis.

JUNE.—Campanula pyramidalis, Fuchsia Rose of Castile, Souvenir de Chiswick, Enoch Arden, Try me O! and Bland's Floribunda; Pelargonium alba formosa, Congress, Hermit, Orange Spot, Delicatum, Rustic, William Hoyle, and Princess of Teck.

JULY.—Geranium Unique, Richard Headly, Tristram Shandy, Andrew Marvel, Herald of Spring, Gloire de Corbeny, Madame Werle, and Rose Rendatler; Fuchsia War Eagle, Ben-e-Gloe, Beauty of Shobden, Modèle, and Blue Boy; Balsams, Schizanthus Grahami, Salvia coccinea, Lilium auratum.

AUGUST.—Salvia patens, Lobelia cardinalis, Lobelia erinus speciosa, Lilium speciosum album, L. speciosum rubrum; Geranium Thomas Moore, Sir Fitzroy Kelly, Beauty of Suresnes, Madame Vaucher, Sensation, Gloire de Nancy, Marie Lemoine, and Wilhelm Pfitzer; Fuchsia Perfection, Starlight, Marksman, and Sir Colin Campbell.

SEPTEMBER.—Sedum Sieboldi and fabarium, Phlox Drummondi, Mesembryanthemum glabrum and roseum, Vallota purpurea, Plumbago capensis, Agapanthus umbellatus, Hæmanthus coccineus, Nerium splendens, Veronica Andersoni, Geraniums, and Fuchsias.

OCTOBER.—Veronica imperialis and salicifolia; Belladonna and Guernsey Lilies; Nerine Fothergilli, flexuosa, and coruscans; Browallia cœrulea grandiflora and speciosa; Salvia splendens, Tremandra verticillata, Mignionette, Colchicum autumnale and autumnale album; Anemone vitifolia, Eucomis undulata.

NOVEMBER.—Russian Violets, Oxalis carnosa, and variabilis; Amaryllis reticulata, Plumbago capensis, Chrysanthemum Adonis, Bob, Rose Trevenna, Aurore Boréale, Cedo Nulli, St. Thais, and White Trevenna; Aster laxus and fulvis.

DECEMBER.—Chimonanthus fragrans and precox grandiflora, Camellias, Erica caffra and gracilis autumnalis, Acacia platyptera, Neapolitan Violets, Solanums, Chinese Primulas, Oxalis lobata and marginata, Epacris autumnalis, E. hyacinthiflora fulgens and E. hyacinthiflora candidissima; Jasminum grandiflora, Christmas Rose.

FLORAL ORNAMENTS

"Bring flowers, young flowers, for the festal board,
To wreathe the cup ere the wine be poured.
Bring flowers! they are springing in wood and vale,
Their breath floats out on the southern gale,
And the touch of the sunbeam hath waked the rose,
To deck the hall where the bright wine flows."

MRS. HEMANS.

CHAPTER I.

SIDEBOARD DECORATIONS.

O many are the social qualities of flowers that it would be a difficult task to enumerate them. We always feel welcome when, on entering a room, we find a display of flowers on the table. Where there are flowers about, the hostess appears glad, the children pleased, the very dog and cat grateful for our arrival, the whole scene and all the personages seem more hearty, homely, and beautiful, because of those bewitching roses, and orchids, and lilies, and mignionette!

Assuredly, of all simple domestic ornaments flowers must have the first place. "Better hang a wild rose over the toilette than nothing," says Leigh Hunt; "the eye that looks in the glass will see there something besides itself, and acquire something of a religious right to respect itself, in thinking by how many objects in the creation the bloom of beauty is shared."

Speaking of breakfast in summer, the same prince of essayists says, "Set flowers on your table, a whole nosegay, if you can get it, or but two or three, or a single flower;—a rose, a pink, nay, a daisy. Bring a few daises and buttercups from your last field walk, and keep them alive in water; and preserve but a bunch of clover, or a handful of flowering grass—one of the most elegant as well as cheap of nature's productions—and you have something on your

table that reminds you of the beauty of God's creation, and gives you a link with the poets and sages that have done it most honour. Put but a rose, or a lily, or a violet on your table, and *you and Lord Bacon* have a custom in common; for that great and wise man was in the habit of having the flowers in season set upon his table—morning, and, we believe, noon, and night; that is to say, at all his meals; for dinner, in his time, was taken at noon; and why should he not have flowers at all his meals, seeing that they were growing all day? Now, here is a fashion that shall last you for ever, if you please; never changing with silks and velvets, nor dependent upon the caprice of some fine gentleman or lady. The fashion of the garments of heaven and earth endures for ever, and you may adorn your table with specimens of their drapery

—with flowers out of the fields, and golden beams out of the blue ether."

It would be folly to assume that our readers need any persuasions to adopt the practice of adorning the inside of the house with flowers; for who does not rejoice in a bright bouquet, or a vase of newly-gathered roses, or a window screened with fresh foliage and pyramids of bloom? Children delight to make posies for mamma, lovers tremblingly present blushing roses to blushing maids, and dimpled cheeks outshine the flowers because the flowers have foolishly competed with them. The serious master of the house bethinks him of the home demands as he hurries about the city, and the consequence is that flower-stands come home in the carrier's cart, and all are impatient to see them filled with their glorious burden. And the good old soul who gets ready that same carrier's breakfast, ere he sallies out into the hot dusty road, has her box of mignionette and her jug filled with wallflowers, and the smoked mantel in her little kitchen is smothered with dry grasses, with a sprig of asparagus berries in the midst, while the window of her parlour, where every Saturday she exhausts her strength in polishing the old mahogany table and the spinnet that her grandmother excelled in playing, opens on a garden that brims over with verdure, and spangles, and odours, that keep her heart alive in the practice of homely virtues.

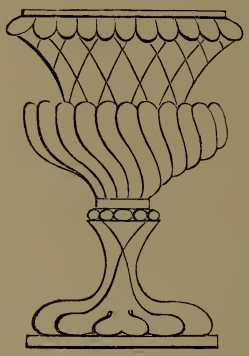
You who have gardens may multiply your enjoyments of them a hundred-fold, by keeping in mind the genial suggestion of Leigh Hunt. Make the most of every ray of light that falls out of heaven to bless you at the window; there you may woo beauty, and have it nod to you in a hundred forms: with a pair of scissors you may, every morning, cull a posy for the breakfast table; you may make the tables, and the mantel-pieces, and the quiet recesses of your rooms gay at all times, and the whole atmosphere of the house as odorous of flowers, as we will hope it is already morally sweet with the interchange of love's language and the expressions of high emotions of the heart.

There are many ways in which cut flowers may be preserved, both with and without suitable appliances. In spring time you may delight yourself by culling a few violets, and placing them in a glass dish, in which there is a little wet silver-sand. The short stems stuck into the sand obtain sufficient moisture, and a glass over the whole confines the fragrance, so that whenever you are inclined to inhale a full breath of unadulterated violet perfume, you have but to lift off the glass, and enjoy it to your heart's content. In the same simple way any short-jointed flowers may be preserved for a considerable time; the partial shade, and the confinement of moisture secured to them by the glass,

preserves their beauty and fragrance, sometimes even for a fortnight, but the most fragile will in this way continue fresh and beautiful for at least a week.

An extension of this idea is carried out in an invention called the Elizabethan Vase, but which is, of course, not necessarily made in Elizabethan designs, but may take Grecian, Etruscan, or other forms, according to the fancy of the maker and the purchaser. The vase is covered with wire-work and a glass shade, and thus becomes a sort of Wardian Case, not for the *culture* but for the *preservation* of flowers.

The principle of a vase for cut flowers requires that it should have a groove all round the upper edge, to receive the glass shade, and wholly exclude the atmosphere. Within, the vase may be constructed in any way



most suitable for supporting the flowers, and if there is any convenient way of introducing a little silver-sand, into which to insert their stems, the better. When the flowers have been arranged, and the glass shade put on, a little water should be poured into the groove, around the glass, to render it air-tight. The advantages are evident, a moist air surrounds the flowers, and they continue beautiful and fragrant for weeks; and whenever it is desired to inhale their fragrance, the glass may be lifted off, and *kept off* for a considerable time without injury, the damp sand sustaining them against the exhaustive influence of the atmosphere. Another advantage of this kind of vase is, that as the flowers do not stand in water at all, they may be safely moved about, whereas in the ordinary way of sticking them in

vessels of water, they fade quickly, their stems decay, and instead of enjoying their fragrance, we are annoyed by their noxious exhalations.

But we must not ignore the open vase or jug of flowers, and so for a moment let us consider how best to deal with it. Directions for filling vases might be multiplied beyond all possibility of usefulness, and perhaps we should be brief rather than prolix on the subject, for just this reason, that people must fill them with what they can get, and ofttimes the hand of taste is paralyzed by the scarcity of subjects for its exercise. The common fault of flowers in vases is that they are "bunched" like greens: too much is thought of colour and too little of form: too much is thought of flowers and too little of leaves. As to the flowers, much positive colour is not desirable, intense yellow is a dangerous element, a soft mixture will usually gratify an educated eye far more than a dashing display of primary colours unrelieved by secondaries or by green leaves. Strong colours are not objectionable, for in truth we need them to light up the whole and give it character; but you will soon see that the line must be drawn somewhere by filling a vessel with the brightest scarlet geraniums only, without a single leaf to tone down the glare. It is very important to make proper distinction between flowers that retain their character, or at least look pleasing by artificial light, for some of the best daylight flowers are but poor things when daylight has fled, and the flame of gas or oil has become the substitute. Nearly all flowers in which there is a notable proportion of blue are unattractive when seen under artificial light. Hence purple and lilac flowers do not usually look well at night, though there are exceptions owing to the intensity of the red in some purples, which comes out well at night and causes them to appear as crimsons. Yellows invariably lose brilliancy, and pale yellows become bad whites under gaslight, but reds and crimsons, all shades of pink and white, retain their beauty, and as a rule green leaves are pleasing under any light.

As to the leaves, it scarcely matters what they are while they simply supply the filling up or foundation—green of some sort appearing, even if obscurely, under the chaste lacing of many coloured flowers. But wherever a leaf appears as a leaf, we must have grace as well as greenness, and happily the poorest garden will supply abundant material for the purpose. Suppose we take first a few orchids, a bit of the lovely *Eucharis Amazonica*, a truss of Christine geranium, a sprig of *Stephanotis*, and finish the whole with the biggest cabbage leaf the garden can supply! It will be evident thereupon that the forms of leaves that accompany flowers are fully as important as their colours, for assuredly we may

find amongst the cabbages some very refreshing tones of verdure. Now it is really true that many bouquets, and vases, and homely jugs filled with flowers, that are admirable up to a certain point, are ruined at last by the introduction of leaves that are as fustian jackets on bonny belles sitting at a tournament. Take away the cabbage leaf, and insert a few tufts of that very cheap and common striped grass of the cottage garden, the variegated *Phalaris arundinacea*. What a change! But you may have finished your bouquet with leaves of *Begonia rex*, or *Coleus Verschaffelti*, or *Cissus discolor*, and have made it quite as hideous thereby as by the employment of a cabbage leaf. Take them away, and put in a bit of *Adiantum cuneatum*, or a few bits of the side shoots (pinnæ) of the common brake (if it happens to be summer-time) or any other of similarly elegant, bright, fragile-textured things, and the flowers will instantly acquire ten times, a hundred times, their former beauty.

Large flowers are, generally speaking, not well adapted for bouquets or vases; such coarse things as pœonies are utterly unsuitable, and even roses are more acceptable if only half expanded, or fairly showing colour in the bud, than when full out and becoming loose with age and expansion. Severity of outline, too, is as objectionable as the employment of coarse subjects. A bouquet or a bunch should alike be elegantly negligent in configuration, a general contour distinctly suggested, but not defined, the tendency to harshness of outline, which flowers regularly packed are sure to produce, broken by the uprising of green sprays of grass and fern, not obtrusively, as if the flowers were there simply to show *them* off, but modestly, and to afford a pleasing relief. To say that a geometric arrangement is never to be tolerated may appear superfluous, but really we have seen in many competitions at provincial exhibitions, flowers grouped in strict accordance with the bedding system,—a ring of yellow, a ring of scarlet, a ring of blue, and a central dot of white. Oh, horror, horror, to think that flowers should grow in the gardens of folks who can use them in this way!

The management of cut flowers will justify a few words of advice. In the first place, the flowers should be *cut*, not torn or pinched from the plants, for bruised or crushed stalks cannot take up nourishment from water properly, but those sharply and cleanly cut can. Flowers gathered by means of the thumb nail will not live so long as those cut with a sharp knife or scissors; and so to begin with, there is a science of obtaining as well as of grouping them. As it is not well to make a toil of pleasure, cold water, hard or soft, may be used for flowers of all kinds during summer. If changed every three days, and the ends of all the stems are clipped off at the same time, the flowers

will last a reasonable length of time and do their duty perfectly. So far we consent to the rough and ready method that the world allows. But those who love flowers will not be content with rough and ready methods always. A few nodules of charcoal in the water will in great part prevent putrescence when flowers have to be left some time in water without a change. A pinch of common salt is a cheap and handy preservative, and actually benefits the flowers as a stimulant. In winter it is best never to employ cold, but tepid water, for filling vases, and to place them in a room warmed by a fire, but always avoiding the exposure of the flowers to a high temperature if possible. A hot dry air will kill them sooner than cold and moisture, but both extremes are bad. Flowers that have been long gathered and neglected, or that have been conveyed a long distance by carrier, or post, may be quickly revived by plunging them in *hot water*, say 100° to 140°, the last figure to be the maximum by Fahrenheit's scale. Almost any plant will bear immersion in water heated to 150°, but it is safer to regard 140° as the maximum, because forced flowers are delicate, and a few very soft-textured hardy kinds are not to be parboiled with impunity. Scarcely less important than the foregoing considerations is the one to be named last in the list. We have shown that flowers should not be exposed to cold unduly, it now remains to be said they must not be strangled. When tightly-tied bouquets are purchased, the ties should be loosened if possible, but that may necessitate making them up again, and the task may be too great. It is quite an easy matter to make up a bouquet sufficiently firm that it will endure a considerable amount of shaking without harm, and yet to leave it loose enough for every stalk to act as nature intended it, as the purveyor of nutriment to the leaves and flowers. There is indeed no necessity to tie flowers at all for home use, and only when necessity really requires it should any kind of ligature be employed.

A SELECTION OF FLOWERS SUITABLE FOR DISPLAY UNDER ARTIFICIAL LIGHT.

The various shades of mauve, purple, and yellow do not come out well by gas-light. We have avoided them, and in the undermentioned selection have named those only which have a peculiarly bright and effective appearance when seen under the influence of artificial light.

The best of those requiring a stove temperature are the following, namely, *Achimenes coccinea*, *A. Stella*, *A. Scarlet Perfection.*

Æchmea fulgens. *Æschynanthus splendidus.*

Amaryllis, all the scarlet varieties, of which there are now large numbers.

Anthurium Scherzerianum. *Aphelandra auriantiaca*, *A. Roezli.*

Clerodendron Balfouri.

Epiphyllum truncatum, *E. truncatum aurantiacum*, *E. truncatum violaceum.*

Eucharis amazonica.

Euphorbia jacquiniflora.

Gesnera Blassi, *G. exoniensis*, *G. refulgens*, *G. zebrina splendens.*

Goodyera discolor, a pretty white-flowered orchid with rich bronzy leaves, which may be grown under the same treatment as ordinary stove plants.

Ixora acuminata, *I. coccinea superba*, *I. crocata rutilans*, *I. javanica*, *I. salicifolia.*

Justicia coccinea, *J. speciosa.*

Plumbago coccinea superba.

Thyrsacanthus rutilans.

Amongst the inhabitants of the greenhouse the following are first-rate, namely, *Azalea Admiration*, *A. amœna* (pretty little sort for forcing,) *A. Brilliant*, *A. Comet*, *A. Flower of the Day*, *A. Grande Duchesse de Bade*, *A. Juliana*, *A. Optima*, *A. Stella*, *A. virginalis.*

Next in importance to the Azaleas we have the Camellias, and of these select the *Old Double White*, *Beali*, *Chandleri elegans*, *Comtesse Celini*, *Donkelaari*, *Fimbriata*, *Ochroleuca*, *Paolina Maggi*, and *Variegata.*

Most of the Epacrises are good, but *Alba multiflora*, *Carminata*, *Eclipse*, *Hyacinthiflora fulgens*, and *Hyacinthiflora candidissima*, *Lady Alice Peel*, and *Miniata splendens* are the best.

Of miscellaneous greenhouse plants, select the light-flowered varieties of *Cyclamen persicum*, the red and white varieties of *Primula sinensis;* also *Dracophyllum gracile*, *Imatophyllum miniatum*, *Kalosanthes coccinea superba*, *K. Phœnix*, *Lilium lancifolium album*, the common White Lily, *Rhynchospermum jasminoides*, *Salvia gesneriflora*, *S. splendens*, *Tropæolum Ball of Fire*, *T. Garibaldi*, *T. double scarlet*, *T. Triomphe de Gand*, *T. Wilsoni.*

Berry-bearing plants with scarlet berries are very showy by gaslight, especially *Ardisia crenulata*, *Rivinia lævis*, *Wetherill's Hybrid Solanums*, *Crategus pyracantha*, *Aucuba fœmina* (true, green leaf,) and the scarlet and yellow-berried Hollies.

CHAPTER II.

DINNER-TABLE DECORATIONS.

When summer comes, the little children play
In the churchyard of our cathedral gray,
Busy as morning bees, and gathering flowers,
In the brief sunshine; they, of coming hours
Reck not, intent upon their play, though time
Speed like a spectre by them, and their prime
Bear on to sorrow—"Angel, cry aloud!"
Tell them of life's long evening—of the shroud:
No! let them play; for age alone, and care,
Too soon will frown to teach them what they are.
Then let them play: but come, with aspect bland,
Come, Charity, and lead them by the hand;
Come, Faith, and point amidst life's saddest gloom,
A light from Heaven, that shines beyond the tomb.
When they look up, and in the clouds admire
The lessening shaft of that aërial spire,
So be their thoughts uplifted from the sod,
Where time's brief flowers they gather—to their God.

BOWLES.

O go over old ground is one of the necessities of this book, but now we have a new subject; for since "Rustic Adornments" first appeared, a quite new order of things has arisen in connection with the embellishment of the dinner-table. The improvement made upon the old "epergne," heavy with precious metal or an imitation of it, is so decisive and delightful, that we are much more desirous of advancing the good points of the new system than of pointing out where perhaps it fails, or tends towards mere repetition, and the groove which represents monotony. Horticultural exhibitions have not in our time accomplished any more useful purpose than the promotion of good taste in

dinner-table decorations, by means of the numerous competitions that have been instituted for the purpose, as they have been throughout the length and breadth of the land.

The exhibitions resulting from the invitations given have had a marked effect on the taste displayed at home in the employment of flowers as embellishments, and, to a certain extent, as necessary adjuncts to festivities and family gatherings. Much talent hitherto latent, or but rarely called into exercise, has been quickened into activity, and many who could appreciate good teaching in matters of taste have benefitted by the lessons offered. In our visits to exhibitions, we have been deeply interested in watching the development of the art

Silver Basket with Flowers and Ferns.

of decorating in this particular department of the economy of the Home of Taste, and it is with delightful satisfaction we have observed the steady improvement from year to year by which these exhibitions have been marked. When they were first instituted, many clumsy contrivances for the reception of fruit and flowers, and many ill-judged combinations of colours, were displayed; there was, indeed, for a time a sort of indefinable want felt by many of some type or standard of perfection, which was in great part supplied when the Misses March made their *debut*, and attained the highest honours at South Kensington, by means of what were immediately designated the "Marchian

épergnes." The majority of all the favourite decorative contrivances have since that epoch in the history of the art partaken more or less of the same characters, and this for good reasons too. In the typical group there was a central vase of three tiers, and two smaller vases of two tiers each, all of colourless glass, and of the simplest design, but in outlines and proportions truthful and elegant. Many variations on this style of decoration have been made with more or less success, but still it everywhere and always has the best chance, provided the furnishing is well done, for on that it depends as much as on the design, save and except in so far as the graceful outlines and adaptability of the vases to the purpose they are designed to serve secure a favourable acceptance. Perhaps we should give the next place to the Plateau, the favourite form of which is first a circular dish of polished silver, or of silvered glass with silver rim and feet, with a group of small glass cornucopiæ or convolvulus-shaped vases, in the centre. This form is well adapted for the display of a group of fruit, but less so for flowers, because we look down upon it; and handsome fruit placed below the eye pleases more effectually than flowers in a like position. When we have a series of vases lifted up, as in the case of the vases figured on page 124, the graceful forms as well as the varied colours of leaves and flowers are effectually brought out, especially because of the free play of light amongst and through them; but the lower dish or tazza may be filled with fruit, and indeed fruit may be mingled with leaves and flowers all through with a most pleasing effect, provided only that the work is well done. Many elaborate and costly contrivances in metal and prismatic glass have been brought into use for the decoration of the table, but the simple glass stem, expanding into simple glass tazzas or vases, has enjoyed distinctive favour wherever it has been ably presented as to dressing, for the simple reason that in this matter simplicity is desirable and complication objectionable; and as to colour, usually bright metals, bronze, prismatic glass, &c., and other *prononcé* materials, make too great a demand on the eye, and fix attention on what does not interest deeply, at the expense of the flowers, which interest all alike from first to last. A moment's consideration will afford the key to the success of colourless glass, and the simplest designs over the most costly, and perhaps, elegant contrivances.

A dinner-table is intended chiefly for the enjoyment of those who sit at it, and should never be made an occasion for ostentatious display of plate or cumbrous ornaments. One of the charms of a good dinner is agreeable conversation; we cannot enjoy a meal that is eaten in dead silence. Now the

SILVER PLATEAU, WITH VASE AND CORNUCOPIÆ.

more heavily weighted the table is with plate or with massive ornaments, the more are the guests oppressed by grandeur and awed into silence. For every necessary purpose of the feast there can be nothing too good. The precious metals are better than crockery for the reception of the viands, and crockery is better than pewter or wood. But there is a point at which to cease in the employment of costly furniture, and we certainly reach it when we begin to enrich the scene with fruits and flowers. These claim admiration on their own account, and require only to be placed in elegant receptacles in an elegant manner, so as to be seen from all points, and to offer no obstruction to the interchange of words and glances across the table, and so as not to overweigh or oppress the social light that belongs to the scene, and which is so easily crushed by excess of grandeur, or much more display of any kind than is appropriate to the place and the persons assembled. The light, simple, elegant vases of white glass fulfil these conditions admirably when skilfully furnished, and even if poorly furnished are often to be preferred to the more elaborate and costly products of the metallurgist, because their very unobtrusiveness is favourable to ease and sociality. It must not be supposed, however, that we intend to utter a general condemnation of ornaments in metal. It matters not what the material may be, or, indeed, if a variety of materials are combined together, provided the requirements of the case are complied with. At a grand dinner we expect to see grand decorations, such as at an humbler table would be extravagant or perhaps absurd; but the comfort of the guests is the matter of primary importance, and the embellishments of the table are to be adapted to that end; the guests are not to be adapted to the decorations. When two friends happen to be placed on opposite sides of a table, with a a large urn stuffed full of artificial flowers in the form of a gigantic cauliflower, and they have painfully to bob their heads right and left to catch the merest glimpses of the extreme outside edges of each other's physiognomies, they are apt to curse the gay cauliflower and its sumptuous receptacle, instead of giving God thanks for their happy meeting and their well-spread table; or, if less profane, will certainly entertain undesirable notions as to the notions of their host in matters of taste and propriety. *The chief adornments of a dinner-table are the guests assembled.* Let that be remembered for ever and ever. The wealth of Crœsus might as well be flung into the sea for the distraction of the fishes as be employed in overloading the table whereat his guests have assembled, not so much to be convinced of his wealth and grandeur as to see each other, and to do justice to his hospitality by enjoying it. For the

present, this perhaps will be enough on the general requirements of dinner-table decorations.

In furnishing vases, plateaux, and other contrivances, a certain richness of effect should be aimed at, but with the softening aid of a certain happy ease and negligence. Let us again take up the story of the requirements. As we are to sit for some time at the table, and may frequently look at the decorations, perhaps even talk about them, the more choice and beautiful the flowers and fruits the better. A good effect in the whole grouping is undoubtedly the matter of highest importance. Weeds tastefully grouped are to be preferred to orchids clumsily heaped up, and as it were thrust upon us. But given a couple of vases equally tasteful as to arrangement, one filled with the commonest flowers of the field or garden, the other with rare and costly flowers, the last must have our preference certainly. We require in the first place a good general effect; for these decorations constitute a part of the *visible welcome* which a table spread for dinner should offer in every one of its several features. But when we have been seated long enough to take notice of the sorts of flowers and fruits that are grouped in the épergnes, the more individual beauty and interest we find amongst them the better. As to suitable subjects, to enumerate them is impossible; their name is Legion. But almost anything and everything that the garden or the field will furnish may be employed, provided the decorator has the taste and judgment requisite for the task. We have seen such things as hollyhocks and dahlias, which, in truth, are "lumpy" flowers for this sort of work, employed with the best effect; and we have seen delicate grasses and fuchsias, which are pre-eminently adapted to the purpose, so badly set up as to have no grace at all, but rather as if to hint to us that an angel when its wings are crumpled is but a chubby child after all—perhaps a clumsy one of his sort. We must, as a rule, be content with what the season and our resources place at our command; but in selecting from our stores, whether they be great or small, a few more of the requirements of the case must be kept in view. Let us once more return to first principles.

In the majority of cases the vases are fitted by daylight, but are to be seen by artificial light, whether of gas, candles, or what else. The particular light under which they are to be displayed is a consideration of the first importance. Usually delicate shades of lilac, such as we have in the Chinese primula, have the appearance of dirty white by artificial light; some shades of blue, such as we have in *Plumbago capensis*, change to a washed-out slate; and all yellows,

from deepest orange to palest primrose, undergo considerable change, rarely for the better. White and most shades of red are least influenced by the quality of the light, and if duly proportioned with shades of green, the grouping may be rendered at once rich, varied, fresh, and pleasing. The experienced artist will at times use almost anything, and all will be right in the end; for the worst colours may be improved by skilful association, as the best may be made obnoxious by excess or injudicious combinations. Suppose it is winter-time, and we cannot have fuchsias for the effect required. We can have the crimson tubes of *Thyrsacanthus rutilans* instead, and in all nature we can scarcely find a better subject to trim the edge of a central tazza with pendent flowers of the best possible colour for artificial light. All roses of every kind look well at night. Geraniums of every kind are equally fortunate, for they do not offer us any blue or yellow tints that suffer change by artificial light. Speaking generally, orchids of all kinds are suitable; sprigs of heath and epacris are admirable. Strange to say, the lovely mauvy flowers of *Justicia speciosa* change to a rich bright crimson under gaslight, and some cinerarias of a mauvy cast, especially if edged with white, come out well. As a rule, beware of blues and yellows of every shade, and of the colours into which they enter largely, as orange and purple, or your best daylight work may be poor indeed when placed beneath the treacherous gaslight.

Systematic colouring is rarely satisfactory; for even if good of its kind—which, by the way, it is not likely to be, because these contrivances do not afford space for the development of anything like a pattern in colours—must fail in the end, because it will weary. Sometimes we see a group of épergnes carefully coloured in circles of red, white, and blue; with regular dottings of green and fern fronds, severely regular, to finish the edges with. They make one dreary after the first five minutes; they are like the bedding system *reductio ad absurdum*. Symmetry is desirable, but that is possible with a certain happy ease and elegance. Nature is symmetrical, but rarely will her best-balanced works bear the test of rule and compasses. The sharply-coloured diapers or mosaics of this sort call to mind Pope's burlesque of the precise verse-makers:—

> "Whene'er you hear the cooling western breeze,
> In the next line it whispers through the trees."

If sharp rings of colour are all we want, paper, calico, or any other cheap and gaudy stuff will answer as well as flowers; and, in fact, a good Chinese

MARCHIAN GLASS EPERGNE, WITH FLOWERS AND FERNS.

lantern with a rushlight in it would please a tasteful eye much more than an épergne filled with circles or divisions of two or three of the most powerfully-contrasted colours. Good *mixtures* should be the aim, but there must be symmetry in some sort, and the colours must have the relief of a sufficient amount of green. The introduction of green in proper quantity and in proper form is a most important matter. Bits of lycopodium and maiden-hair fern are sure to be appropriate. Small leaves of many kinds may be used with advantage. Variegated leaves are frequently useful, but we must beware of such as are coarse, or which have a sepulchral air by gaslight, as may happen with leaves of begonia, cissus, amaranthus, and coleus. Many of the lighter kinds of wild and garden grasses may be used with great effect. We shall never forget how Mrs. Cutbush once charmed a thousand people at an exhibition at Highgate by trimming the edge of the topmost vase of a Marchian stand with the vivid green of *Isolepis gracilis*, forming a fringe of fairy tassels to a glorious assortment of leaves and flowers. Nor shall we soon forget how Mrs. Saunders, at the first display of dinner decorations at Taunton, achieved an artistic triumph by preparing first a series of groups of exceedingly rich flowers, and then subduing and harmonizing their colours by means of a green lace of fronds of *Adiantum cuneatum* gently laid over them. We might indeed, draw upon our memory for hundreds of instances; for we have had to judge these things officially so often that the habit of analyzing effects has become a sort of second nature. But we will be content to say that the somewhat heavy head-piece of the silver stand, as it appears in our engraving, page 124, was in reality one of the most successful examples of green filigree work we have seen, and it consisted chiefly of lycopodiums.

There is yet another matter of some importance. It is that the flowers are required to last some time; if they fall to pieces before the feast is over, it is matter for regret, and may be evidence of defective work in the first instance. The subjects should so far as possible be selected, not only for their fitness as to form and colour, but as to capabilities of endurance. The lovely and delicate *Spiræa Japonica*, which looks too frail for enduring the heat of a dining-room for an hour, will wear out the longest night and still look fresh. The stoutest leaves of caladium that can be found will begin to look flaccid, perhaps will actually shrivel, in an hour or two in a dry atmosphere. Perhaps as much depends upon the mode of setting up the flowers as upon their relative texture and powers of endurance. Those that have been carefully cut with a knife will last longer than those the stems of which have

been mangled by rude finger-nails, or even with scissors; for crushed vessels cannot take up moisture so effectually as those that have been cleanly severed. It is of course desirable that all leaves and flowers should be somehow in contact with water; yet, when fruit and flowers are mingled in the same dish, that is impossible. Then thick-leaved or hard-leaved subjects should have the preference, as they can better endure the tax of evaporation than those of a papery or tissue texture. Something may be done, however, to assist the fragile candidates. Take a frond of maiden-hair fern; dip it in water, gently shake it, so that it appears dry, and, whether placed with its stem in water or not, it will last out twice as long in a hot room as a frond from the very same plant that was not so dipped. There is no mystery in the matter. There is a certain amount of moisture, the result of the dipping, entangled in the texture, especially about the margins of the pinnules, which assists to preserve its freshness; in this we have the explanation of the fact. Generally speaking, dipping is not necessary, but it is well to bear in mind that, when our work is likely to be severely tried, we have this resource to aid it.

There are many more points that might be dwelt upon, but we must be content to mention only one, and that is, that flowers which emit agreeable odours or that are quite destitute of fragrance are to be preferred to such as offend the nostrils; but powerful odours are scarcely to be desired, as, for example, the fragrance of the common white garden lily soon becomes wearisome if close under the nose for a couple of hours or so. Some odours are agreeable to some persons and obnoxious to others. No one, we suppose, could endure the putrid-meat-like smell of stapelias; and, fortunately, though extremely beautiful, their purple and brown tints are quite unfit for decorative purposes; but the chrysanthemum is a fair example of the debateable flower, which we must use with caution, because to some it is agreeable and to others otherwise. Recurring to the subject of colour, and remembering that in November, when chrysanthemums are at their best, other flowers are scarce, the temptation to use them at that season is great, because as a rule they look well by gaslight. But it is possible for some one placed near a group of these most useful flowers to be very unhappy by reason of their peculiar odour; and, as our duty is to make our guests happy, we had better abstain altogether from the introduction of flowers to the table than gratify any whim of our own in so unchristian a manner as to inflict pain, however slight, upon a friend.

"O, the offence is rank, it smells to heaven."

MARCHIAN GLASS EPERGNE WITH FRUIT AND FLOWERS.

We may suitably close this chapter with a few words on the best way to employ lycopodiums in vases and plateaux. These plants should be grown for the purpose in shallow pans of perforated zinc. Those for the bottom dish must be made in two separate parts, unless the stem of the stand screws out; and in that case a hole in the bottom, and a small tube soldered over it, to keep the soil in its place when the stem is withdrawn, will be sufficient. The depth of the pans need not exceed an inch in the centre, for even then there will be ample space for the soil, the surface of which should assume a convex form. The perforations in the material of which the vessels are manufactured will afford a ready means of egress for the water; nevertheless a thin layer of very small potsherds should be placed over the bottom. When this is done, fill in with a light open compost consisting of two thirds peat, broken up rather roughly, and one third very small crocks and silver sand in equal proportions. All the dwarf selaginellas of herbaceous character are very easy to propagate, as the young growing points, taken off carefully and dibbled firmly into the soil, will, if placed in a moderately warm and close atmosphere, and shaded from the sun, soon form dense tufts of the most delicious verdure; and the only requisite attention to preserve them in a healthy state will be to keep the specimens properly supplied with water, and to avoid exposure to currents of air and bright sunshine. To maintain the soil in a moderately moist condition, partly fill sufficient ordinary seed-pans with cocoa-nut-fibre refuse, half-decayed leaves, or silver sand, and place the plants, after forming a basin to receive the concave bottom of the pan in which they are grown, in them, when not in use on the dinner-table. The most suitable species for growing for table decoration are *S. apoda* and *S. denticutala.* The last is perhaps the most useful of the whole family, as it thrives with equal vigour in the temperature of a cold greenhouse or that of an ordinary stove, *S. helvetica* is another fine greenhouse kind, with foliage of a brilliant green colour. *S. serpens* is valuable because of its bright tone of green, which contrasts so well with all flowers that look well by gaslight; but it requires the warmth of a stove, as also does the beautiful metallic-coloured *S. uncinata*, which is well known under the name of *cæsia.* This species is grand for the top of a stand, where its long shoots can hang over the sides. The stalks of fern-fronds and flowers can be inserted in the soil of the pans, which will keep them fresh for as great a length of time as others placed in sand or water.

CHAPTER III.

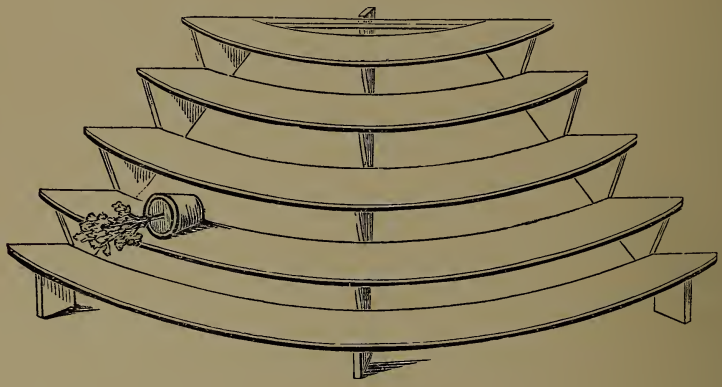
DECORATIONS FOR THE HALL AND THE SIDEBOARD.

These are thy wonders, Lord of love!
To make us see that we are but flow'rs that glide,
Which when we once can find and prove,
Thou hast a garden for us where to bide;
Who would be more, swelling through store,
Forfeit their Paradise by their pride.

HERBERT.

ALTHOUGH the seasons must determine by their productions the nature of the materials to be employed, certain principles of action apply to all the various methods of embellishment adopted for festive gatherings and holiday times. We may take lessons at flower shows to advantage, but we must modify our tactics to suit the domestic scene, for the formality of a display resulting from a settled competition is the very thing we do not want. But let us take one lesson on a point of art. We enter an exhibition, and find the plants on high stages of rough wood, and we see the pots in which the plants are grown far more perfectly than the plants themselves. This is a quite common mistake. In another instance, we find the plants staged on a low bed, the ground-work being a clean grass turf, the pots hidden perhaps by means of baize or grass mowings, or at least overshadowed by the plants themselves, so as to be no longer obtrusive and therefore objectionable features. Here is a good practical lesson, the angle of vision must determine the primary features of the arrangements, or suggest the devices necessary to obviate the results of inconvenient positions. Now let us find another lesson. We may see in an exhibition of the grandest character

features scarcely less objectionable, though perhaps unavoidable in the association of many plants in large groups, the result being a monotony of glaring colours. The continental exhibitions far surpass our own in this respect; artistic grouping is usually attempted, and not without a pleasing degree of success. Suppose we gather up a lot of pelargoniums all aglow with flowers, and put them all together as a group. They will scarcely please a true artist, however frenzied with delight the florist may be with their perfections. We will therefore separate them and mix them up with ferns, palms, cupanias, the elegant *Cyperus alternifolius*, and the very characteristic *Yucca aloifolia variegata*. The difference is so great, that if decorating is to be a



Exhibition Flower Stand.

matter of principle at all, we have it plainly proved that elegance of form is of as much importance in the selection of plants, possibly of more importance than richness of colour. Of necessity we must have both, and the most lumpy subjects that afford abundant flowers will prove of the utmost value if relieved judiciously by means of plants that have bold, distinctive, and elegant outlines. Therefore those who grow plants for home use, should be careful to have a sufficiency of subjects adapted to give the relief desired—flowers are rarely wanting, and too often are too profusely employed. There are occasions, however, when flowers in masses become acceptable, and here is a suggestion for the embellishment of an entrance hall on the flower-show principle.

A friend of ours has had a large hall fitted so that it can be made at an hour's notice either a picture gallery or a flower show. He has had copies made of certain celebrated pictures on canvas to roll up like drop-scenes at a theatre, the rollers and cords are hidden with a cornice, and when the pictures are shown, they fall down into gilt mouldings, so as to appear like great oil paintings in handsome frames. To make the change, the pictures are rolled up and disappear under the cornices, and flower stands, made to take to pieces and fit together with bolts and screws, take their places. The construction and use are shown in the annexed diagram.

Any plant that makes a dense head of bloom will do for this sort of display; a centre of white cinerarias, and two sides of crimson or blue cinerarias, make a grand spectacle in early spring on the occasion of a birthday fête. In summer, calceolarias, verbenas, geraniums, and lantanas are admirable subjects.

Plenty of plants of two or three sorts to make even surfaces of colour from top to bottom, are the proper materials for furnishing. Any who adopt this scheme will adopt also their own modes of furnishing, and it only remains to give a hint as to maintaining the show for any length of time, as it is obvious the same plants will not endure to be laid on their sides long without either getting dried at the root or turning their heads up so as no longer to present a full face to the spectator. It is imperatively necessary, therefore, to remove the whole of the plants every night to a clean pavement or flooring of tiles, and there soak them with water, and leave them till the morning. They may then be replaced on their sides, and the same plants will hold out for a fortnight. Our friend's hall has a garden entrance, by means of which the work is done without any disturbance of the household.

Now let us prepare a Christmas sideboard on the plan represented on the accompanying engraving. It must be well done or it will be no adornment. First, a wreath of holly formed on a stout wire, the only safe way to make the wreath is to bind to the wire a succession of *small* pieces of holly, each piece consisting of a bunch of berries and accompanying leaves. The wreath must be firmly fixed in its place, and the simplest mode of accomplishing that will be to attach the ends to blocks of wood by means of small staples, as the blocks can be hidden and will hold the wreath steadily. The plants may be very different in character from those represented, but they must be good; the selection made, however, for the figure, would produce a brilliant and quite seasonable display. In the centre are three plants of *Poinsettia pulcherrima* (No. 7) crowned with gorgeous crimson bracts. Next these on either

A CHRISTMAS SIDEBOARD.

side pot plants loaded with berries of *Cratægus pyracantha*, (No. 1.) Another charming berry plant is *Solanum capsicastrum*, chubby specimens of which are to occupy the next places, (No. 2.) The scarlet-berried *Skimmia Japonica* or *S. oblata* comes next, (No. 3.) Then yellow-berried hollies, (No. 4.) Next the wreath we should have pompone chrysanthemums of a light colour to draw out the design to its full dimensions, (No. 5,) and to finish at either end small plants of *Aucuba Japonica* well furnished with scarlet berries, (No. 6.) To finish the work, place a light lattice in front, and screen the pots from view, by filling in between them and the lattice with green moss or with green wool clipped very small.

The practical reader will anticipate difficulties that the inexperienced would never dream of in first entertaining the idea of carrying such a scheme as the foregoing into effect. It will be seen that the plants must be grown for the purpose, and that some of them are so rarely met with in a form suitable for such work as to be perhaps apocryphal. We must therefore say that we have carried this very scheme into effect exactly as represented, and it was an easy matter, because we happen to have cultivated berry-bearing shrubs in pots for many years past for the "plunging system" to be described in this book hereafter. Of all the plants named, only the *Poinsettias*, *Chrysanthemums*, and *Solanums*, are to be purchased in the ordinary way, though the other subjects are neither scarce nor costly. Happily as remarked above, the furnishing may be varied, and there is abundant room for selection of subjects wherever plants are grown in pots and decorating is practised. But the berries are so desirable for the Christmas season that we may in the absence of suitable potted plants resort to the expedient of cutting fruitful branches of holly, pyracantha, aucuba, &c., and potting them firmly in pots filled with wet sand. Very good imitations of plants may be obtained by this method, and they will help out the furnishing satisfactorily. There are several varieties of cotoneasters suitable for the purpose, one of which, *C. microphylla*, may be found in almost any garden.

It remains but to make two remarks on the mechanism of the arrangement. In forming the wreath, first bind the wire with worsted or twine to afford a firm holding for the ties. The trellis may be obtained by cutting up a few of the expansible flower-pot covers which are now everywhere in use, but if these are not obtainable, a screen may be easily formed by means of a few laths with short twigs of evergreens tied on them.

Ivy screens have already been remarked upon as valuable auxiliaries in the

preparations for festivity. We mention them again because it is in this connection we can best recognise their merits. They may be improvised by the aid of large plants in pots, and suitable receptacles for them provided with trellises, over which the plants are to be trained. But to develope the idea in its integrity there should be provided light iron frames on small wheels, and boxes fitting to these frames in which to grow the plants. The canopies should consist of stout wire net of largest mesh attached to a framework of light iron rods, or of a framework only of elegant design, to be filled in by means of copper wire by the cultivator, according to his taste or the requirements of the time. It would be best always to begin with strong plants, more especially as there are always to be found at the nurseries Irish and English ivies five or six feet high in pots, at from one to three or four shillings each. A sufficiency of such plants, carefully trained out, would produce a good effect at once, but we should not expect to obtain screens worthy to be regarded as models in less than three years.

In the first edition of this work, published fifteen years ago, we recommended the cultivation of ivies on moveable verandas and canopies; we can now record that many of our friends have carried out the suggestion with complete success; so that they may become so far popular that manufacturers will probably soon provide us with better and cheaper contrivances for the purpose than we have been hitherto compelled to use.

Returning once more to the subject of winter flowers, we will dispose of snowdrops, crocuses, hyacinths, and tulips in very few words, but those words shall be such as are not to be found in nurserymen's catalogues. All these bulbs (and a few more that are really not worth mention,) may be grown in water or moss on the sideboard and in the window, and in almost any kind of receptacle. The old-fashioned hyacinth glass is nearly extinguished, and we now see beautiful Etruscan vases, porcelain baskets, rustic boxes, and urns employed in this department of domestic gardening. All things considered, Tye's hyacinth vases are the best, both in respect of usefulness and elegance, of any among many contrivances that have competed for popularity. If it were as easy to grow the flowers in dwelling-rooms as it is to buy suitable receptacles for them, we should have little to say upon the subject here, but the ten thousand "directions" circulated by traders in bulbs bring forth little fruit, for, as a rule, the examples commonly met with are such as can only give pain to those who know what good cultivation means, both as to requirements and results. Bulb-growing in glasses and other elegant vessels may be con-

sidered a failure always, and the one prevailing cause of the failure is *insufficiency of light.*

We will not dwell upon the subject, for fear we should dispirit some who find in this branch of parlour gardening an agreeable recreation, attended with remunerative results. But we will make one remark on our own practice, for we do employ bulbs largely in domestic decorations, as well as in the embellishment of public fêtes and soirées in the winter season. All the bulbs intended for this work are planted in pots in rich soil, and have the usual greenhouse or stove culture that would be required for plants intended for exhibition. In other words they are really cultivated, and their flowers have their true colours, and are borne on stems capable of supporting them. It is a very small task indeed to shake them out, wash off all the soil from their roots, and insert them in the ornamental vases, and then they are ready for their place in the fête, and will maintain their good looks and fragrance for a fortnight if required, if only treated with a little care. By this method of procedure a grand display is secured; but we lose the recreation of growing the flowers by the fireside, which may be too great a price to pay for it.

The last subject demanding notice in this section is that of Everlasting Flowers, and these are far more deserving of eulogy than many will suppose who know them only as they appear in the London shops. The very last idea of those who provide these flowers for sale is to allow nature to speak in or by them. They are *dyed*, and thereby we lose their natural colours. They are mixed with grasses and mosses, also dyed, and they are gathered up in ugly bunches, as if intended for brushing crumbs or cobwebs—not at all as if intended to serve as ornaments, and to take their place as flowers.

The only way to employ these beautiful flowers with good taste is to preserve their natural colours, and mount them all upon wires, for their stems do not maintain their original rigidity sufficiently, and moreover in the manipulations to which they must be subjected, they are likely, if not wired, to separate from their stems, and become suddenly useless. A short essay on the subject will close this chapter appropriately; we beg that it may have attention, for, though short, it contains much, and is thoroughly practical.

First as to cultivation. All the annual sorts, both of everlasting flowers and grasses, are best grown by sowing the seeds in light rich soil in March or April, and treating the plants in just the same way as asters; that is, in brief, getting them strong by the middle of May, and then planting them out. But if this is not convenient, they may all be sown on a rich light sunny

border, in the early part of April. Every patch should be tallied, and a bit of seed of every sort kept in reserve. About the middle of May sow again any that have not by that time come up. By this plan you will be likely to secure all the sorts on which you speculate. As for the greenhouse plants adapted for drying for winter use, they require good cultivation. The best of them is the *Aphelexis*. It is a difficult plant to grow, too much or too little water being pretty certain death to it. The soil should be good turfy peat, and plenty of silver sand. The pots should be prepared with great care to insure perfect drainage. The plants must be potted firm, and with the collar slightly above the surface. Plenty of light and air are essential. The beautiful *Phœnocoma* requires similar treatment. As for the greenhouse *Statices*, they require a soil half loam and half peat, and a warmer and closer part of the house will suit them than the two plants first mentioned would require.

Next as to gathering the flowers. Take them in all possible stages; but by far the largest proportion should be young and scarcely expanded, as they are sure to expand in the process of drying. To dry them, lay them on papers in an airy warm place, *safe from dust*, and store them when dry in dry closets or drawers where dust is as nearly as possible unknown. The grasses may be dried by simply laying them between folds of blotting-paper, or placing them between the pages of large heavy books. Remember "practice makes perfect;" the beginner is sure to spoil a few; never mind, there will be many good ones to make amends.

As to mounting, the grasses must be used in their natural state; but it is best to mount the flowers on wires. This is a nice proceeding; but ladies generally acquire the art in haste. The finest steel wire is the best adapted to the purpose, and it is attached to the flower at the base by merely thrusting it into the centre; but the wire should have a few twists to make a sort of base to catch the flower, or rather, for the base of the flower to rest on. As to modes of grouping, that must be a matter of taste and practice. The illustration represents a wreath formed of helichrysums and grasses, and filled in with green moss, the solid foundation, or ring of the wreath, being formed of the wires on which the flowers are placed, twisted and twisted into a sort of rope, with the moss thickly entangled between them.

The best everlasting flowers for this purpose are the following:—

Helichrysums of all kinds; more especially *H. atrosanguineum nanum* and *H. Borossorum rex*. All are half-hardy annuals, to be raised on gentle heat, and planted out in May, or sown in the open ground in April. As they are

so useful, it would be well to try all the sorts the seedsmen can supply.

Acroclinium roseum. Sow in pots and pans in April, and place in cold frame, or sow in open border and risk it.

Rhodanthe Manglesi, R. atrosanguineum, R. maculata, R. major. All half-hardy annuals.

Helipterum Sandfordi and *H. corymbiferum* require careful culture. Sow, if possible, in February, and treat as perilla or lobelia. These are the least likely to succeed if sown in the open border in this country. They are so beautiful that they well repay a little extra care.

Polycolymnia Stuarti. A quite hardy annual, but none the worse for being pushed forward under glass.

Ammobium alatum is a perennial, but may be treated as an annual, as it is sure to be killed by a sharp frost. Treat it as half-hardy.

Waitzia corymbosa, *W. grandiflora*, fine half-hardy annuals; but of no use to beginners for winter wreaths. They must be started early to make sure of a good bloom.

Xeranthemum annuum, *X. album*, *X. caryophillioides*, and *X. purpurea* are fine hardy annuals, all of which may be sown in the open ground in April. They are not the most desirable, as their colours are apt to fade when dried, but this may be in some part prevented by drying them *quickly in the dark*, and in a very dry warm atmosphere. Try them in an oven when the fire is nearly out.

As for *Aphelexis*, and *Phœnocoma*, and *Statice*, all the varieties known are good.

The following is a list of Grasses suitable to grow in the garden or collect from the hedgerows, as the case may be, for associating with helichrysums, etc. In the first list are such as may be purchased in seeds or plants:—*Avena sterilis*, *Agrostis nebulosa*, *A. plumosa*, *A. pulchella*, remarkably pretty; *Bromus brizæformis*, *Chloris radiata*, *Chloropsis Blanchordiana*, *Briza maxima*, *gracilis*, and *minor*. *Ceratachloa pendula*, large imposing spike; *Chloris barbata*, *Eragrostis elegans*, *Hordeum jubatum*, *Dactylacteneum Ægypticum*, *Elymus glauca*, *Lagurus ovatus*, *Leptochloa Schimperiana*, *Monochyron roseum*, *Panicum sulcatum*, *Paspalum stoloniferum*, *Pennisetum longistylum*, *Stipa elegantissima*, *Lappago racemosa*, *Milium multiflorum*, *Panicum compressum*, *P. jumentorum*, *Setaria macroseta*, *Gynerium argenteum.*

The following are wild grasses of the most beautiful character:—*Phleum pratense*, *Milium effusum*, *Agrostis spica venti*, *Aira cæspitosa*, *Arrhenatherum avenaceum*, *Avena flavescens*, *Melica uniflora*, a lovely thing; *Glyceria fluitans*, *Festuca gigantea*, *Bromus asper* and *sterilis*, *Juncus lampocarpus*, *Carex remota*, *C. pendula*, *C. sylvatica*, and the varieties of the cultivated oat.

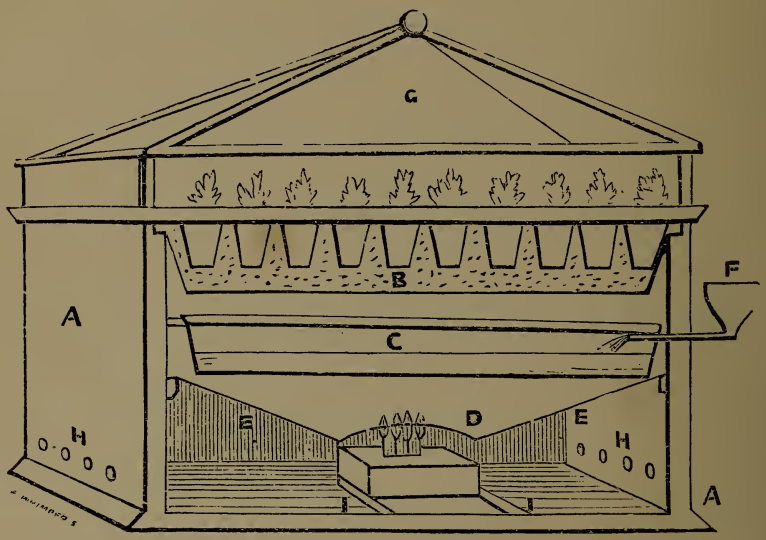
THE MINIATURE HOTHOUSE.

No works indeed
That ask robust, tough sinews, bred to toil
Servile employ; but such as may amuse,
Not tire, demanding rather skill than force.

COWPER.

N as few words as possible, it is intended here to give a sufficient account of sundry contrivances which have been adopted as aids in the cultivation of plants, where the ordinary plant-house heated by hot water, or the humbler but eminently useful hotbed are things beyond the reach of the cultivator. We have had to say much about flowers, and many readers may by this time be comparing themselves to Tantalus—their desires great, their means of gratifying them few. Wanted a miniature hothouse suitable for the occupation of a study or a spare room, or even for the bedroom of an invalid, who could find amusement in raising plants from seeds and cuttings, if only the means were at hand without the necessity of braving the bleak winter air or encountering the damp of a conservatory. The thing is quite possible, as we shall proceed to show, but we will first take occasion to say that this subject has engaged much of our attention, and we have grown thousands of plants in the bedroom windows, and in the greenhouse too, by the aid of a miniature hotbed heated by the flame of a candle or a lamp. It has all the appearance of a toy, but in truth, if well managed, a hotbed of this kind may be made a most valuable auxiliary to the garden, and enable a lady to raise an abundant stock of tender plants for the greenhouse and for the summer bedding. Probably there is plenty of room for further invention, to render this department of parlour gardening more enjoyable in practice and less precarious as to results; but

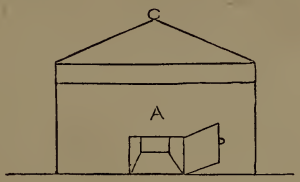
for the present we shall bring forward three examples, all alike in principle, though varying considerably in their several ways of carrying the principle into effect. It will be seen that the essential features are a close box with glass top, a metal tray on which the flower pots containing seeds or cuttings are placed, and a boiler beneath for diffusing heat equally throughout, this boiler being heated by a flame of some kind.



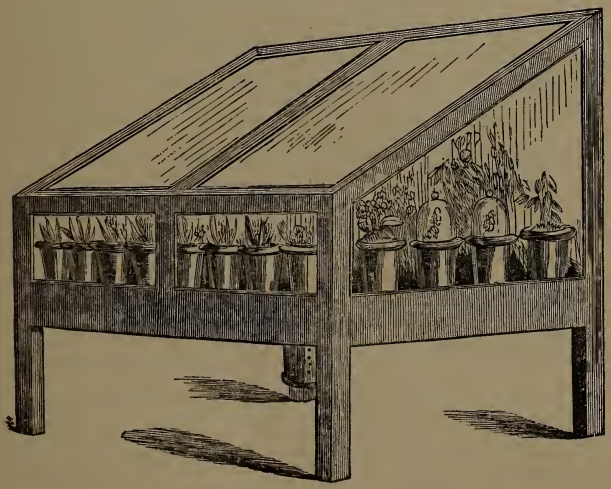
French Propagating Case.

The first is the FRENCH PROPAGATING CASE, brought into notice in the "Bon Jardinier" (vol. iii.,) and which we had in use during three consecutive winters, and found it answer admirably. The figure represents this case in section. A, is a square wooden box lined with zinc; it is twenty inches square and one foot high. B, is a zinc frame, perforated with small holes. C, a tin or copper pan for water. D, a lamp with four burners, colza oil being employed in preference to any other. E, a diaphragm of zinc to confine the heat to the water, the space within D, where the flame of the lamp plays being filled with heated air causes the boiler C to be heated equally over the whole of its under surface. F, is a funnel for filling the boiler.

G, a zinc frame fitted with glass, the whole of which can be lifted off at pleasure. The sides are perforated with holes to admit air for the combustion of the lamp, as shown at H. The lamp is thrust into the centre of the space below by means of the grooves I, and when the contrivance is at work



it has the appearance shown in the small engraving, where it is seen that the slide for the lamp is closed with a door, which should be of glass, in order that the operator may readily become aware whether or not the lamp is burning properly.



Waltonian Case. Fig. 1.

Next in order we will consider the WALTONIAN CASE, so named from the inventor, Mr. Walton, of Sarbiton. This has the appearance of a common

garden frame mounted on legs, as represented in the accompanying engraving. It is adapted to be heated by a jet of gas, an oil lamp, or a candle, at the option of the operator, but where gas is available it is certainly the best. Although such a case may be made larger or smaller than the one to be described, the measurements given will be found convenient in practice for the majority of persons.

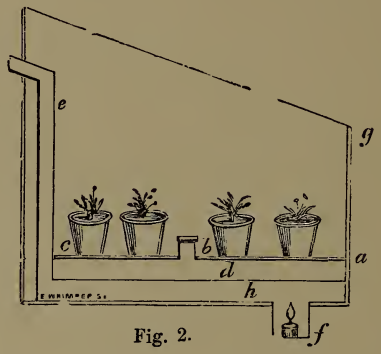


Fig. 2.

From end to end inside, the case measures twenty-four inches; from front to back inside, seventeen inches; superficial area, five hundred and sixty-eight square inches. Height inside at front, ten inches; at back, thirteen inches and a half. The bottom of the frame externally is seven inches from the ground, and its appearance is particularly neat and compact. As originally

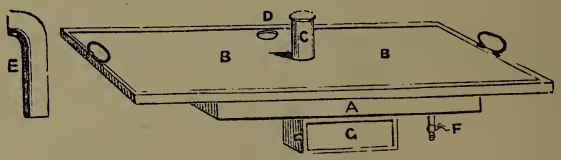


Fig 3.

made, there was a tin box suspended in the front for an oil lamp. That is now superseded by a box with a bottom of perforated zinc, and a sliding glass in front. In this box is placed, for heating purposes, the candle, made in the fashion of a Child's night-light, but with more substance for continuous burning and supply of heat. The perforated zinc admits air to keep the

candle burning; the glass enables the cultivator to see if the candle is burning properly. To set the case to work, the top lights are lifted up; an inch depth of silver-sand is laid down and wetted; the boiler is filled by pouring water into it through a tube in the centre, and the candle is lighted. Pots of cuttings, seeds, etc., may then be placed close together on the bed of sand, and the amount of air to be given is regulated by the top lights. Fig. 2 is a sectional side view of the case when at work.

Let us now take the case to pieces. When the lights are removed, and of course the pots also, the tray, on which sand is spread, may be lifted out by means of a couple of handles for the purpose, and its appearance is represented in fig. 3, in which A is the boiler which gives heat to the tray B B on which the pots stand; C is the tube by which the boiler is filled. The tube has a stopper which can be removed so as to fill the case with steam, if the cultivator

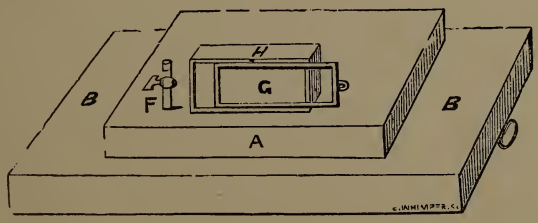


Fig. 4.

chooses to give the cuttings a vapour bath. If the sand is kept regularly wetted, there is no occasion for its removal, except to fill up the boiler, which holds about two quarts. The boiler is heated by the passage of the hot air from the lamp passing through it, and the hot air escapes (not very hot, by the by) at D, in fig. 3, to which, when at work, a small pipe flue, E is fixed, so as to carry the products of combustion out of the case. It makes so little smoke (even with the lamp) that a piece of new board placed against the end of the pipe flue was but barely coloured, after having received the smoke upon its clean surface for three months continuously. The boiler is emptied by means of a stop-cock, F, in fig. 4. There is no occasion to use this stop-cock unless from neglect in changing the candle the heat has declined, when the cold water can be drawn off and a fresh supply of hot water introduced, and of course the tap is useful when the case is put away when its work for the season is

over. The box, G, is that already described as the receptacle of the candle, and thus the circle of appliances is completed.

Those who have never seen a Waltonian Case will, perhaps, be still further assisted to form a correct conception of its construction and use if we turn the tray upside down as in fig. 4. Here, as before, A is the boiler, B B the under side of the tray, in which the pots stand, F the stop-cock, G the glass front, and H perforated bottom of the candle-box.

There remains one matter to be explained, and that is the construction of the boiler. This is formed of stout zinc, as in fig. 5. It is attached to the

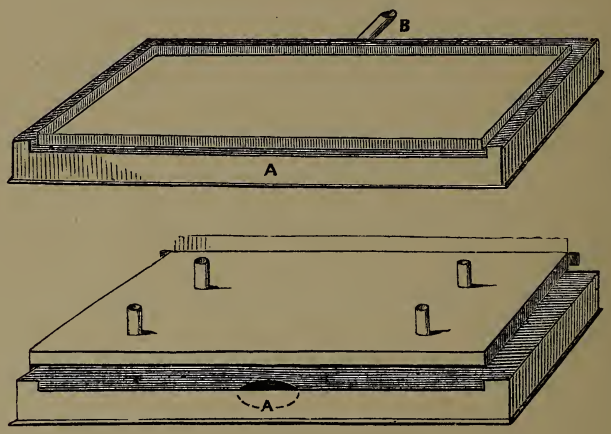


Fig. 5.

large zinc tray on which the bed of sand is laid. It consists of A, an outer case, with orifice near the front, three inches in diameter, for the entrance of the hot air from the flame of lamp or candle. On the side corresponding to the back of the case is a small escape pipe, one inch in diameter, formed of lead, to which is attached the tin or zinc chimney or flue. This outer case, in which the heat from the lamp circulates, is twenty inches by thirteen inches, and two inches deep. The inner case, B, is a simple trough formed of sheet zinc, turned up at the edges and kept at its proper distance from the bottom of the outer case by means of four short legs or rests, one inch in length, formed by zinc bent into tubes; thus the boiler proper is three quarters of an inch deep.

The last example is the RICHMOND CASE, invented by an amateur who contributed the particulars to the "Floral World," as an anonymous benefactor of his fellow amateur florists. We shall reproduce the description in the inventor's words, slightly abridged for the present purpose.

Fig A.

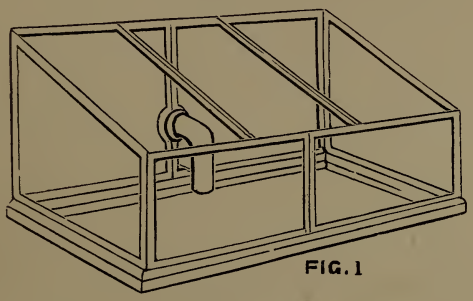


Fig. B.

The Richmond Case.

The frame, fig. 1, thirty-four inches long, seventeen inches wide, seventeen inches high at back, and ten inches at front. The whole is zinc and glass. The zinc frame-work is the same as the common hand-lights, being of zinc plate, bent as in fig. A; mitred at the angles and soldered. The lower edge of the frame which lies upon the tray is bent out as fig. B, and a strong piece of iron wire covered with zinc is at the mouth, and serves to strengthen it and keep the whole in shape, until the glass is finally fixed, when it is as firm, if not firmer, than wood. Round the three openings at the top there is a ledge, upon which the covers rest when the frame is shut. The chimney to carry off the smoke is fixed to the frame in two places, being made to shut over a short piece of pipe on the tray, the bottom being below the sand in the tray, so that the slightest smell of smoke from the lamp cannot get into the case. The back, sides, and front being all of glass, the frame, when complete, is really very light and pretty; and the putty which holds in the glass only projecting from half to three quarters of an inch, there is as much light as possible. It is necessary to have small pieces of zinc soldered at intervals upon the frame, to hold the glass in its place until properly fixed with putty.

The tray, fig. 2. This is a trifle larger than the frame, forasmuch as the frame drops into it. Thus, when in place, and filled with sand an

inch deep, it is quite hermetically sealed; and the water which is condensed runs down into the sand and moistens it, so that less watering is required. The edge of the tray is strengthened with iron wire like the edge of the frame. The water tank and the pipe in the centre are as usual. My tank seldom wants replenishing, as little steam is allowed to escape from the

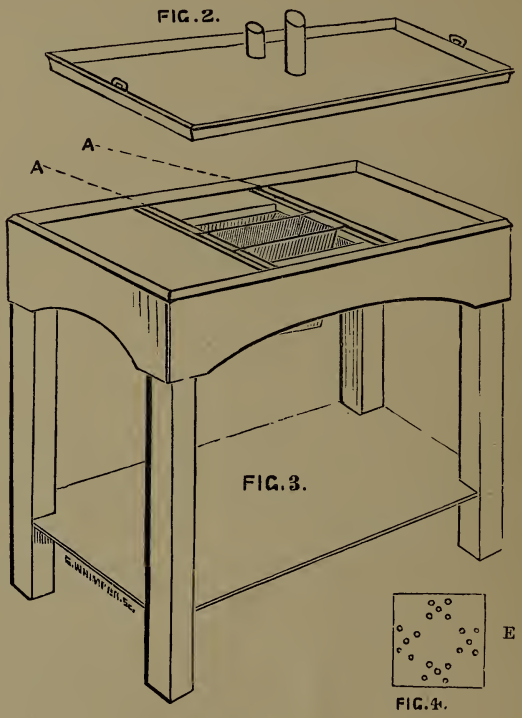


Fig. 3.—A A, Iron bars which support the Lamp Case.

pipe, the moisture being so much retained in consequence of my plan of having the frame to drop into the tray.

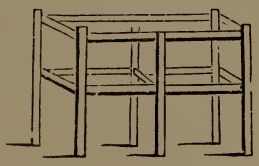
The wooden stand, fig. 3. When the tray has been placed on the wooden stand, then the frame is placed on the tray, care being taken to have the smoke pipe just over the piece of pipe on the tray; that the glass back be

not jarred. The stand is of stout yellow deal, which may be painted any colour. The frame and legs are of two-inch square stuff, and then round the slide, at the top, deal boards are nailed, as shown in the plan, about eight inches deep at the corners, and less in the middle; and these rise about two inches above the floor upon which the tray rests, so as to form a protecting ridge for the frame and tray, and this serves not only to keep them in place, but gives a finish to this part, and hides the lamp case. The flooring upon which the tray rests is covered with coarse flannel, which, being a non-conductor, keeps in the heat. Beneath the centre, and just

FIG.5.

below the bottom of the tank (indeed it rests upon them,) are two bars of iron an inch wide, and one eighth of an inch thick; these hold the case which contains the lamp, which I shall describe hereafter. My stand is between three and four feet high, which I have found the most convenient height, and this arrangement allows me to have a shelf at the bottom, about ten inches from the ground, upon which I place the cuttings, seeds, etc., to harden off before they are removed to the greenhouse, etc. The whole is

FIG.6.



upon castors, that it may be easily removed from room to room; and when not used as a forcing case, the upper part may be taken away, and in summer it serves as a stand for flowers, either in the room or greenhouse.

Zinc seed pans, figs. 4 and 5, seven and a half inches square, four inches high. E, gives a view of the bottom, in which small holes, about an eighth of an inch in diameter, are pierced for the drainage. My case takes eight of the above size, which being square, and all of the same size, I can shift them from place to place, as the seeds come up and require more light; and

by placing glass on the top each one becomes almost hermetically sealed, and I can place other pots with cuttings, etc., upon them.

I would here mention a contrivance which I have for making my case as useful as possible, by means of which I can fill it up to the top. I have two skeleton wire stands, which, being rather less than half the length of the case, and two inches lower, stand against the back, and form shelves upon which I place the pots to be hardened off, removing them from the bottom to the upper shelf. The construction is shown in figure 6.

The square zinc pans go between the legs in the lower part. Glass is placed on the shelves, and pots stand upon these, so that I have a little stand upon each shelf, on which the plants are placed, and have the greatest possible light.

It is necessary now to speak of the lamp and its box.

One gallon of colza oil lasts me more than six weeks, and this when the frame is constantly kept in full action. The tube which receives the cotton is three quarters of an inch long, and one quarter wide. It is desirable not to have the cotton too tight, but sufficiently so not to slip through. The rim at *a*, fig. 7, unscrews, the tube is taken out, and the cotton fixed in it, as in fig. 9; it is then replaced. The rim at *c* is next unscrewed, and the oil poured in until it reaches the bottom of the supply tube; it is then replaced. The whole is then ready for lighting. The cotton, to burn well, should not be more than one eighth of an inch high. My lamp requires trimming twice a day—the first thing in the morning and the last thing at night. By trimming is meant the cotton simply cut with a pair of lamp scissors, and then raised with a pin the right height. It is then fit for lighting. Oil should be supplied once a day, although it will go longer without. If there should be the least appearance of smoke, either the cotton is not cut straight, or it is too high, and must be lowered at once. The case is made of zinc. One strip of zinc about five inches wide forms the bottom, the two ends, and the pieces bent over at A A, fig. 11, which rest upon the iron bars in the wooden stand, just under the tank. The side, B, is fixed with rivets; the door, C, is hung on hinges, these being made of zinc and riveted. The object in not having any part of this soldered, is to guard against any accident, and especially at *night*, when the lamp is left burning. Thus, should a cone of lampblack be formed, and become ignited, it would produce sufficient heat to melt the solder, the lamp would fall out, and the frame be ignited. I know this to be possible, as such an accident (short of burning the wooden stand) did occur with mine, before I had perfected the lamp.

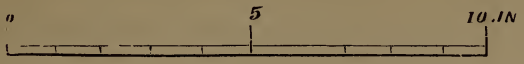


FIG.7.

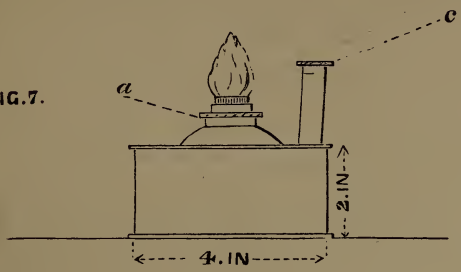


FIG.8.

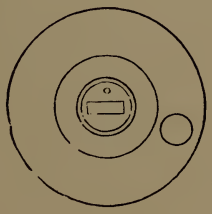
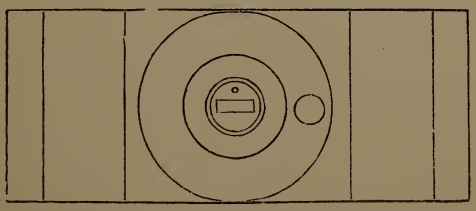


FIG.9.

FIG.10.



Scale, quarter of an inch to an inch. Fig. 9. The tube for the cotton removed from lamp. Fig. 10. Bird's-eye view of lamp-case and lamp.

It is worthy of remark that this lamp is the cleanest thing imaginable. It is always trimmed in the dining-room, in which the case is at work. The supply tube being so much above the burner, no oil can get on to the screw to soil the fingers when unscrewing the top; and it has this advantage

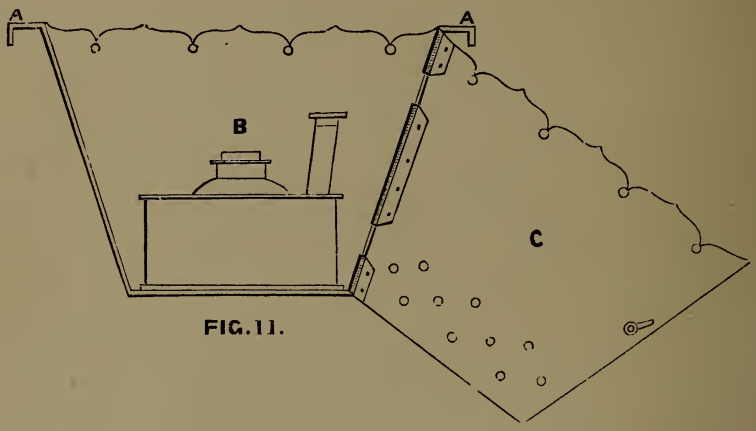
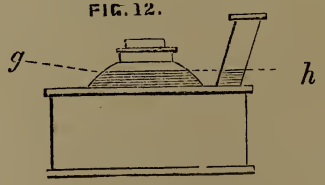


FIG. 11.

Fig. 11. A A, These rest on iron bars fixed in the top of wooden stand, and support it.

also, that you cannot fill the lamp too full, so as to overflow, except you be the most careless of the careless. The tube is sufficiently wide to look down it, so that you see at once when it has reached the top, and the lamp

FIG. 12.



is full; but should you exceed this, the contrivance which I have adopted of *doming* the upper part under the wick, assists you, as it receives the excess and prevents it running over. There need not be the least spot of grease. If you fill it to the point *h*, fig. 12, it will not rise higher in the dome than *g*.

An improvement of the lamp is represented in figure 13. It consists in the addition of a cover P, to exclude dust and supply air to the flame, and a spring N, which raises the lamp as its weight decreases and thereby brings the flame into closer proximity to the boiler as it wanes in power.

If such complicated apparatus as we have been describing are not within command, an extremely simple contrivance may be resorted to for striking a few cuttings or starting a pinch of seed into growth. Take two flower pots, of sizes suitable to fit one within the other, as in figure 15. Pierce holes in them in order that a candle or nightlight may be kept burning in the lower one. An hour's work with a small sharp screwdriver or a stout square-pointed awl will accomplish this. Fit a saucer filled with sand on the topmost pot, and over that put a glass of some kind. You now have a miniature propagating case, and may render it sufficiently serviceable to justify the little trouble incurred in preparing it.

A few particulars of the management of these parlour propagating cases

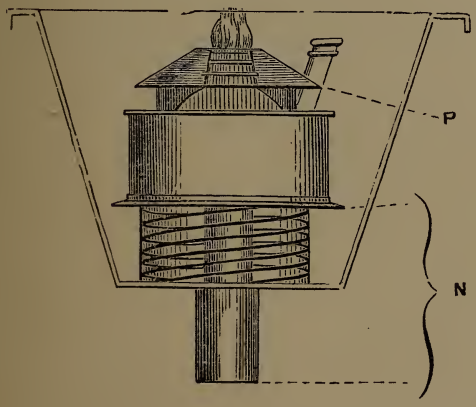


Fig. 13.

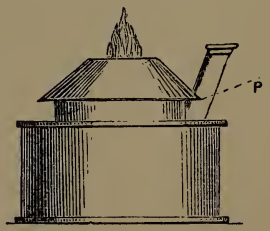


Fig. 14.

will no doubt be acceptable ere we quit the subject. First as to heating them. A gas flame is the best possible source of heat, because of its cleanliness, constancy, and the ease with which it may be regulated. Colza oil must rank next to gas; and as it is a difficult matter to obtain a suitable lamp ready made, we are tempted to recommend Spiller's "Lover's

Lamp," though we must confess we know this lamp in use only as a nightlight, as it was not in existence in our days of experiment with propagating cases. Petroleum oils may be used with safety no doubt, and being so much cheaper than colza, are worth attention. We confess to have once made trial of a petroleum lamp with a tin chimney (glass is out of the question,) and the result was a complete failure. In this case the apparatus was in a greenhouse, and the shock to the air of the house consequent on opening the door, blew out the flame.

Given heat enough below, there must be a bed of moist material for the pots to stand upon, or the heat will not rise freely. When, through neglect, the sand in the tray becomes dry, the same result follows as when it is made excessively wet,—the temperature declines and the plants suffer. A moderately moist condition of the sand must be maintained at all times, and if the heat is constant below, it will never fail to rise and keep the cuttings, seeds,

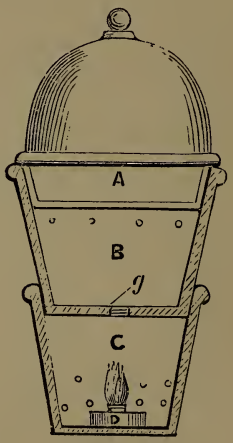


Fig. 15.

etc., in active progress. These cases are generally kept too hot. If a thermometer is placed amongst the cuttings, so as to be visible on the most casual inspection of affairs, it will afford at any time information of the state of things. A safe temperature for all ordinary purposes is 60° Fahrenheit. The highest point allowable is 70°. The range should be between 45° and 65°.

CHAMBER BIRDS.

With other ministrations thou, O Nature!
Healest thy wandering and distempered child;
Thou pourest on him thy soft influences,
Thy sunny hues, fair forms, and breathing sweets:
Thy melodies of woods, and winds, and waters!
Till he relent and can no more endure
To be a jarring and a dissonant thing
Amid this general dance and minstrelsy;
But, bursting into tears, wins back his way,
His angry spirit healed and harmonized
By the benignant touch of love and beauty.

COLERIDGE.

CHAPTER I.

THE CHOICE OF BIRDS FOR CHAMBER KEEPING.

BIRDS are the very types of freedom and wilfulness, yet they pay a heavier and more constant tribute to man's sovereignty than all else in creation. Of all the creatures that are entrapped, hunted, or domesticated, birds doubtless fare the worst. If snared by the fowler, it is to lose their sweet liberty for

ever, and run the gauntlet of a thousand abuses, whether by the wantonly cruel, or the careless and ignorant who attempt to keep them. But the fowler is only one amongst many enemies. Everywhere the idea prevails that birds are the enemies of the farmer and the gardener, and therefore are to be snared, shot, or otherwise persecuted, as if the great Author of nature had made a mistake in ordaining the existence of this wondrous portion of his work. Within the past few years observant men have sought to instil into the popular mind more truthful views of the necessary relationships of bird-life to the economy of nature in general, and to man's interests in particular; but impressions are made slowly when we wage war against superstitions and prejudices, and this generation will not see justice done. The general question does not perhaps immediately concern us, yet we cannot well commence this section without adverting to it, because, in truth, we intend in what we have to say, to keep in mind, if we can, some reasonable limits within which to exercise our choice of birds for domestication, that we may purchase our recreations at the least possible cost to the feathered tribes. Many birds, renowned for beauty of plumage or sweetness of song, are caught and caged only to suffer for a while and die. It is well known that such is the case, yet perhaps few take into consideration the extent to which this practice robs nature of her ornaments, and to that extent diminishes the sources of pleasure in rural life, while more material interests are damaged by the destruction of creatures that are eminently useful to man. On the other hand, many kinds of birds are so well adapted for domestication, that provided they are fairly treated they appear to gain as much in one way by the loss of liberty, as in another they lose with it. Nor is it a matter of small importance to select birds with a view to their adaptability to a life of confinement, for those which most readily adapt themselves to it and take to human society as a "second nature," occasion the least trouble, and are therefore likely to have the best care from first to last. To keep a number of soft-billed birds, more especially if the collection include nightingales and blackcaps, is a serious task, demanding incessant labour and forethought, and not easily delegated to another who is unaccustomed to its requirements, or less interested in the results than the owner of the collection is supposed to be.

Our rule at every point in this work is to provide as far as possible safe and easy ways into the very heart of our chosen recreations, avoiding all the difficulties that an enthusiast in any one particular pursuit might elect to contend with, and rejoice to overcome. It is especially needful now to keep to this rule strictly, for the life and liberty of a bird command respect

and sympathy, and we may not trifle with either without due consideration.

There are two classes of birds from which we may make selections *ad libitum*, or nearly so, for their requirements and habits adapt them in a wonderful manner to the conditions under which they must live when domesticated. The most important of these two classes are the PARROTS, including of course macaws, cockatoos, parakeets, and lories. Beautiful plumage, great imitative powers, individuality of character, and ready attachment to persons, are their principal recommendations. In the estimation of many, the FINCHES, as a class, may be considered to have higher claims; but we give them the second place because of their comparatively inferior intelligence and more slender attachment to their keepers. There is a great charm in the manifested affection of a pet of any kind, but the friendship of a parrot is something *sui generis*. Those who repudiate the idea, must bear to be told that they lack the sympathy which begets love, or have had but few opportunities of observation. Our bird experiences range over nearly twenty years, during which time we have had the house almost constantly peopled by birds of all kinds that by any possibility could be kept in rooms or cages. The result of our observations is that bird-keeping, with the best intentions, is apt to degenerate into a refined sort of "cruelty to animals."

When we reckon up all the accidents and catastrophes, when we call to mind successes that we cannot be proud of, and wrongs wilfully committed against our pets and ourselves, in the neglect or ill usage of them by others to whom they have been sometimes entrusted, we are quite disposed to advise our readers to begin bird-keeping with a moderate ambition, and at every enlargement of the pastime to take heed that it does not overpass reasonable limits, for one bird, lovingly cared for as a member of the family, is of far more real value to enliven the household than any number, however rare and costly, that entail more trouble than can be endured to do thorough justice to them. It is in full view of the difficulties into which an amateur may unwittingly be plunged, that we commence with an especial recommendation of parrots and finches; they are healthy, lively, interesting, teachable birds; they afford abundant variety of colour, habit, and vocal power; and to keep them in the best condition will occasion less trouble than to do the same by any other classes of birds that can in any way be considered suitable for the household.

It is not however for us to presume to limit the range of choice of those of our readers who wish to gather from these pages useful information. The bonny thrush, pouring out his lusty song from beneath the cottage porch, and

the merry lark, piping from beside the mechanic's window, proclaim plainly enough that there are other birds besides parrots and finches that may be preserved in health and happiness in cages, with no more care than can be bestowed by those who have small means, little time, and who make no pretensions to a scientific knowledge of the subject. It will be proper therefore to include a select few of the more interesting and easily kept cage and chamber birds in this brief essay, in addition to those of the two great classes from which the majority should be selected.

It is equally important in commencing bird-keeping to estimate our means and conveniences fairly. A birdroom may be made a delightful feature of a Home of Taste, and in one and the same room, by judicious management, a great number of birds of the most varying characters may be kept, and the association will greatly simplify the code of management, because a few leading articles of food will serve for the whole of them.

A birdroom, however, is by no means a necessary feature in a house, even if the proprietor be intensely devoted to ornithological pursuits. Many of our friends who keep collections of birds prefer to have them scattered about,—a canary here, a lark there, half-a-dozen pets together in some other place, and perhaps a grand aviary cage filled with small foreign birds for the principal attraction in the dining-room or entrance-hall. The mention of foreign birds suggests another consideration, that, as a rule, they are more to be valued than our own native songsters. Nowhere does the thrush sing so bravely as on the greening bough that overhangs the lawn. The shrill piping of the lark in the clear heaven is a thousandfold more inspiring than the most joyous lay of the same bird uttered from a patch of turf in a cage that holds the aërial minstrel close prisoner. A robin will fly about a room, and trill out a joyous carol from the curtain-pole; but we prefer to see and hear the defiant little songster as he goes about in lonely dignity in the garden croft, or follows the gardener whom he has never seen before, as if he had been trained to do so from the nest. Song birds constitute so important a part of the attractions of the country, and are usually so welcome, and, we may add, beneficial, in English gardens, that if we must have birds in the house, foreign lands can better afford to supply them, and the immediate gain is, that we thereby enlarge our experiences, leaving the natives free to gladden us from without, while the foreigners, with whom we could not otherwise become acquainted, enliven the domestic circle, and prosper in the shelter and tendance our love and care have provided for them.

CHAPTER II.

PARROTS, MACAWS, COCKATOOS, ETC.

In painted plumes superbly drest,
A native of the gorgeous east,
By many a billow tost,
Poll gains at length the British shore,
Part of the captain's precious store,
A present to his toast.

Belinda's maids are soon preferred
To teach him now and then a word,
As Poll can master it;
But 'tis her own important charge
To qualify him more at large,
And make him quite a wit.

COWPER.

N Cowper's translation of Vincent Bourne's Latin ditty, we have one of the best possible recipes for success in the training of a parrot. The announcement that "'tis her own important charge" may be considered but another version of the rough adage, "if you want a thing done, do it yourself;" yet in respect of the teaching of a parrot, this is a matter of the utmost importance,—to delegate this task is to sacrifice one of the best amusements that accompany the keeping of parrots, and perhaps put the education of the bird in jeopardy as to final results. Constant personal interest in the birds, resulting in watchfulness for their welfare, is of the utmost importance, for servants will neglect or mismanage them unless looked after vigilantly, and visitors will teaze them, and now and then a lesson may be imparted, the acceptance of which may render the bird obnoxious for months, for years, perhaps, indeed, for the rest of its life.

Given this first condition of success, all the rest is easy. Parrots that are kept in cages must have ample room not only to move about quietly, but also for the occasional fluttering of their wings, this exercise being most beneficial,

and a source of enjoyment to them. Those kept on perches must have light chains of sufficient length to permit a free action, especially in those gambols which the birds engage in when the frolicsome fit is on them, and they become the most dexterous of acrobats. The apparatus for a healthy and vigorous macaw, or any other bird on perch and chain, must be perfect, the swivels acting instantly without a hitch, and the stand heavy, firm, and strong, to withstand the tendency of the bird to overbalance it. Cheap flimsy cages are not only frail and perishable as household goods, they are positively injurious to the birds put into them, for they soon discover the weak points, and pass all their time in pulling them to pieces: while engaged in this diversion they pay little heed to their lessons, and, like idle boys at school, acquire bad habits instead of useful knowledge. Nor does the mischief of a cheap cage end with a bad moral influence on the bird. It may be that "Poll" or "Cockey," by patient tugging and twisting, contrives to escape when there is no one near to impose a check on its awakened love of liberty. The next diversion of the escaped prisoner may be to make an ineffaceable mark on every piece of furniture in the room, and end by making a merry flight round, and sweeping all the nic-nacs off the mantel. Such things have occurred many a time and oft, and at the moment of writing this, we have to lament the disfigurement of the front of the library table, and the almost complete destruction of a leather writing desk, by the combined efforts of a pair of sulphur-crested cockatoos, that have this very day contrived to obtain liberty without leave, and an hour's undisputed possession of the library.

It is a great preventive of such mischief, besides being directly beneficial to the birds, to accustom them to a taste of freedom periodically. A bird that is kept constantly confined will not know how to behave, may be reckless with excitement, on suddenly escaping from its cage by some accident, and it is impossible to keep parrots for any length of time without now and then such an event occurring. There is, however, a very simple means of making fast the doors of cages, and if the wirework is sound the bird is completely under control. It is only necessary to provide for every cage a little sixpenny padlock, which may be obtained of any ironmonger, and have one key attached to a block of wood or an ordinary key ring, so as to be handy for use whenever wanted.

In recommending large cages for all kinds of parrots, it must be understood that they must be proportioned to the sizes of the birds, and also to convenience

of moving about, for they should all be taken out to the garden daily throughout the summer, and a thoroughly strong macaw's cage is a formidable thing to carry. The more strength the better, consistently with elegance of form and portability, and in every case the best possible cage should be obtained in accordance with the means of the purchaser, for the commonest parrot is worth the best housing that can be provided for it. Some parrots pass the greater part of their time in the swing, if they have one; others will rarely use it. If it is found that a bird dislikes the swing remove it, but make it a rule by all means to provide for every one that cares for the amusement of swinging the means to enjoy it. An important advantage of a roomy cage is that the bird can traverse its perch beneath the swing without touching the latter, for if it chafes its back at every move, it must in time become disfigured and more or less injured in health thereby. Brass cages are perfectly innocuous if kept scrupulously clean.

Although we speak of the birdroom, and of groups of birds in rooms, it is but proper here to add that with few exceptions all birds, large and small, parrots, finches, warblers, etc., etc., behave better, sing better, talk better, learn more quickly if kept apart, so that they neither see nor hear each other.

In the management of parrots simplicity should be aimed at in every matter. Coddling and high feeding are simply ruinous. A coddled bird will mope, as if half dead, or will only make it manifest that it is really alive by plucking out its feathers until it becomes an object of disgust to others and a misery to itself. As for extravagant feeding, that too will cause the bird to pluck out its feathers, but it will probably scream instead of moping, and make every one wretched who happens to dwell in the same house with it.

Parrots, to speak of them generally, and without reference to particular species, are truly omnivorous; and in view of that consideration, they should have considerable variety of food. The smaller kinds of parakeets and lories feed on seeds and vegetables only, but all the larger kinds may be kept in perfect health on a regular diet of bread and milk, and maize, with small allowances of hemp and canary seed. To these articles of daily food may be added, for variety, bread and butter, dry biscuits, fruits, nuts, the stones of stonefruits, the pips of oranges and apples, and other trifling dainties of the like nature, that are neither sweet, nor salt, nor greasy. The bread and milk should be made daily for the morning meal; if in the slightest degree sour or watery, the birds will either refuse to touch it, or will suffer in health if they do. The crumb of stale bread should be scalded, the water quickly squeezed out of

it, and then good new milk added to make a somewhat tenacious paste. The maize should be prepared by keeping it for some hours in a saucepan just covered with water by the side of the fire, so as thoroughly to soften but not actually to cook it. Parrots and cockatoos of average size will require to have their cans supplied every morning with about two tablespoonfulls of bread and milk, one tablespoonful of softened maize, and one teaspoonful of mixed hemp and canary seed. The dry seed may be put into the same vessel as the maize. As the food should be always sweet and good, it is well to prepare supplies of maize at least twice a week, except perhaps in the depth of winter, when, if carefully managed, it will keep good for a whole week. The best way to have it always ready for use is to put it, when sufficiently softened by the fire, into a clean earthen jar with the water in which it has been steeped; if the water is poured away, the grain will shrivel and require to be softened again, a process which will pretty well take all the goodness out of it.

This daily supply of food will not be alone sufficient. We have always made it a practice to feed all our birds at dinner-time, and expect them to ask for it, and give thanks with approval of the quality. "Is that for Poll?—thank you: so nice," may be heard with variations as the customary dinner music in our house daily, (Sundays included.) This close association of parrots with the affairs of the household increases their value a hundred-fold; it quickens their observation of persons and things, makes them familiar with the members of the family and the principal visitors, and gives occasion for many a comical episode, that, to use a homely comparison, is "as good as a play." Here we approach the dread question whether parrots should have animal food or not. We are ready to join with those who prohibit animal food entirely, because of the possible danger that may result from its use by inexperienced persons. I once saw a near and dear relative presenting to one of our cockatoos a large piece of toasted bacon of a particularly salt description, and had just time enough to stay her hand before the bird had obtained the poisonous dose. It was done in kindness, of course, and was justified by the fact that we had been heard to say our parrots were allowed to "eat anything." Well, we must repeat here that such is nearly the fact, and on the question of giving meat to parrots, we do occasionally give them bones of poultry, rabbit, or hare to pick, taking care that there is but the mere shadow of meat, and not even the shadow of fat on the bones. These amuse them vastly, and they do get a savoury picking from them which they enjoy, and are none the worse for.

Very minute morsels of lean roast beef or mutton may be given when the birds are moulting. Bread and butter they are very partial to, and it suits them well in the after part of the day, and biscuits of almost any kind they will accept with gladness. As above remarked, sweet, salt, or greasy food of any and every kind should be avoided, and when bread and butter is given, a very thin film of the latter should be allowed. Filberts, Brazil nuts, walnuts, and chestnuts are wholesome if used in moderation, but otherwise if given in excess. Some cockatoos have such a *penchant* for Brazil nuts, that they will eat to an injurious excess if supplied with sufficient. One nut per diem is enough, but all the large birds may have two or three of any other kind of nuts daily.

Having said so much of eating, we must add a few words on the subject of drink. The bread and milk, and moist maize, will supply sufficient moisture to grey parrots, and some cockatoos. But others again are "thirsty birds," and must have drink regularly. Where very many birds are kept, water must be supplied in tins in the usual way. But in the management of a few it will be found good practice to offer each bird weak milk and water in a spoon in the after part of the day. When they get used to it they will ask for it, and the kindness will be well repaid. These birds often suffer from thirst when their owners little dream of the agonies their pets are enduring. When a parrot commences an unearthly screaming, as if bent on driving everybody mad, offer a spoonful of drink. In the majority of cases, birds scream in this way to let us know they are thirsty.

Having had very little experience of sickness amongst our parrots, we cannot say much on that part of the subject. One prevailing cause of ill health and bad temper is injudicious feeding. A bird fed principally on hemp seed must sooner or later suffer, it may be with mere irritability of the nervous system, but it is more likely to be with disease of the heart. In many cases where our advice has been asked about ailing birds, we have prescribed the withholding of hemp seed altogether, and that has been found sufficient. In resorting to this extreme remedy, it is advisable to keep the bird without food for half a day at least, and then introduce some nicely prepared bread and milk, and maize, and keen hunger will gratefully respond, and all will go well. When a parrot mopes over its food, it is the worst of all practice to endeavour to tempt it to eat. Take away the food, put the patient in a place where amusement is plentiful, as in a window commanding a view of moving objects, or in the garden if the weather permits of it. After

three or four hours' abstinence, food will be welcome, and will be gratefully eaten, and the moping will be cured.

If parrots are kept in heated rooms in winter, or too closely shut up indoors all the summer, they become delicate in constitution, and take cold on receiving the slightest breath of air. These birds should be kept thoroughly hardy, for in constitution they *are* hardy, and coddling is ruin to them. Colds are accompanied with various symptoms, as, we may suppose, they vary in character. In some cases, the bird has a difficulty in swallowing its food, or is troubled with fits of sneezing, or quietly mopes and gapes as if weary with watching. A warm quiet place should be chosen for the sufferer, and one or two of the small capsicums called "chilies" should be given. If these are not at hand, almost any other dry, pungent stimulant will answer as well, such as a peppercorn or a thin slice of bread with a very little cayenne-pepper rubbed on it. The little chilies are the best, however, and there ought always to be a few in the house ready for use wherever parrots are kept.

Three golden rules are to be kept in mind as conducive to success in the treatment of parrots. They must have plenty of light and air, and be considered as hardy birds, save and except that exposure to cold draughts and burning heats might result in death, and are sure to result in injury. A bath, either by dipping or by means of a shower from a hand syringe, should be adminstered once a week at least all the summer, but only in the summer; at other times it is injurious. So far as to the avoidance of coddling. Another golden rule is to feed liberally, for shortness of food induces lassitude and ill temper, and we want to see life and cheerfulness in parrots. Lastly, compulsory dullness is like death to these naturally merry creatures. Therefore take care to provide them with amusement. A window whence Poll can see passers by, will suit her tastes admirably, but if she must be shut into some dingy hole she will be very glad of a piece of rough wood, or say a cotton-reel to play with. Want of proper occupation and amusement sometimes leads them to pull their cages to pieces, pick their perches clean away, and remove from themselves every feather they can get at, so as presently to appear like paupers who have torn up their clothes. Parrots must be occupied in some way or other, and hence we find that those which know the most speeches and tunes, and are constantly performing, have the best health: the busy mind is the most to be desired, for the body benefits by sympathy and association with the spirit of cheerfulness that reigns within.

It has been remarked above that *all* the parrots and their allies are worthy of domestication. In the parrot-room at the Zoological Gardens, Regent's Park, may be seen an extraordinary collection of these birds; a collection not surpassed by any other in Europe. Before purchasing, especially as parrots are costly birds, it would be advisable to have some knowledge of the characters of the several species, and we advise all lovers of these invaluable pets to spend a few hours occasionally at Regent's Park, in the company of the garrulous psittacidæ. To refer the reader to a good book on parrots is not in our power, for there is nothing of the kind in the English language. Bechstein is a safe guide so far as he goes, and to that extent his work is invaluable. The volume devoted to "Parrots" in Sir W. Jardine's "Naturalist's Library" (vol. x.,) the work of Mr. P. J. Selby, will be found both interesting and useful for reference, and the pictures are sufficiently accurate to assist in the identification of species.

The most desirable of the family for the household are the following:—The Great Green Macaw, the Blue and Yellow Macaw, and the Red and Blue Macaw. These are costly birds, possessing enormous strength, and sometimes irascible tempers. The last named of the three is most to be coveted both for its beauty and capabilities. They are not clever birds, but may be taught a few words, and will soon learn to imitate street cries and the barking of dogs, the mewing of cats, etc. If not kept scrupulously clean they soon become offensive, and if trifled with by strangers they may inflict injury of serious amount in retaliation. They do best on strong metal perches, but if in cages they must be large and strong, or they will soon be torn to pieces.

The Common Grey Parrot thoroughly deserves its popularity, and a more rational mode of treatment than it usually receives. To say that it surpasses all other domestic pets in imitative power, and that it may be met with in almost every household, is to repeat what everybody knows, and so we will not attempt an appropriate eulogy. Too often Poll is spoilt by injudicious feeding and insufficiency of air. We have trained many young birds, and they have become perfect polyglotts in the course of two years, and though wrathful and at times almost unmanageable at first, they soon became as gentle as doves, though full of frolic and sometimes a touch of original fancy. Kindness, combined with prudence, is sure to tame the most savage bird in time. Anything in the nature of punishment, such as scolding and blows, (and we have known blows to be administered!!!) is not only reprehensible, but ruinous, for it destroys the confidence of the bird, represses the development of affection, and

increases the irascibility it is intended to cure. In teaching, it is best to be content with a few very simple lessons at first; these should be repeated at every opportunity in a distinct manner, and quite unmixed with observations or reproofs. A grand old Poll in our family greets us all daily with "good morning," with inquiries added as to our respective healths; calls for her dinner, and expresses approval of its flavour; whistles "The girl I left behind me" perfectly; she sings "Pretty Polly Hopkins;" pipes the diatonic and chromatic scales, and repeats a number of street cries with great variety of comical accent. She learns a new lesson in the course of a few days, if carefully taught, yet when she first came to us fifteen years ago, a newly-imported savage, a whole month was occupied in teaching her to say "Polly," which was the only lesson then attempted. Be patient and persevere. There is no such thing in the world perhaps as a Grey Parrot that cannot talk, but there are many that have been so far spoiled in teaching and general management as to be no longer worthy of a moment's attention from an amateur, except it may be to pity them, and deplore the ignorance and apathy which lead to the spoiling of such noble pets.

The Festive Parrot, the Amazons Parrot, and the Blue-headed Parrot, are interesting and beautiful creatures, extremely docile if taken proper care of, but not highly gifted with powers of speech. If only one of the group be desired, let it by all means be the true Amazons Parrot, the "papagey" of the Brazilians, a most elegant, lively, garrulous bird, peculiarly fond of children, and perfect in its imitations of their laughter, cries, and calls.

The Great White Cockatoo is a princely bird, most gentle in demeanour, with lovely eyes, and feathers like flakes of a savoury turbot. The Tricolor-crested Cockatoo has a splendid crest, and is gaily painted white and red. The Sulphur-crested Cockatoo is in all important respects like the Large White, except in size, and the distinguishing crest which, when elevated by surprise or joyousness, gives it a most elegant and defiant aspect. We have tamed Cockatoos so perfectly that they would follow us about the garden, and be ready at any time for a romp, sometimes mounting high in the trees, to the alarm of friends who were not used to such a dispensation of liberty, but always coming down when called, and taking possession of the mistress's shoulder to be caressed and played with. One Sulphur-crested Cockatoo enjoyed for many years complete freedom in the house and garden, and rarely abused the privilege by injuring anything. One that we have now might be trusted to go about without restraint, so far as to its homing propensities; but it is so destructive

that one day of liberty in the house results in so much injury to the furniture, window-sills, to anything indeed which can be hacked, broken, or torn, that we cannot suffer it, and he is commonly kept in a large cage, with a padlock on the door. But he enjoys an hour on a perch every morning, while the feeding and cleaning take place, and, being then under surveillance, has little opportunity to make his mark on the kitchen furniture.

The Rose-breasted Cockatoo, *Plyctolophus rosei-capillus*, is the most docile and affectionate of all the large parrots, and a lovely, fantastic, playful creature, too; a joyous, but quiet companion.

The Rose-ringed Parrakeet is certainly the most elegant and interesting of its race; a charming creature, combining the wildness of the parrot with the softness of the love bird. It may be fed the same as the parrots, but should never taste hemp seed, except as a treat in aid of training. Bread and milk will supply it with sufficient moisture, and instead of maize give it a mixture of canary and millet.

The pretty little Grass Parrakeets, or Budgerigars, are now everywhere to be seen, though only a few years ago they were expensive rarities. It seems to be but yesterday that we thought ourselves fortunate in obtaining a pair for five guineas, but now we may expect to see hundreds of them hawked about the streets on costermongers' barrows, at a few shillings per pair. They require the most simple treatment imaginable: they are lively, playful, cheerful, and hardy. They soon learn to know and love those who are kindly attentive to them, but at first are shy and frightened, and need comparative quiet until they become accustomed to the house and its people. They are commonly kept in cages far too small. They need plenty of room, both to prevent injury to their long tails, and for their merry gambols, for they play like mice about the cage, and chirrup all the while like very loud sparrows. The best staple diet for them is canary seed; but they like the seeds of grasses, plantain, and a bit of groundsel now and then, which is all the more welcome if it has a root attached, with a few crumbs of mould adhering to it. We have succeeded best with them by observing as a rule to keep them ordinarily without water. But about once a week during winter, and twice or thrice a week during summer, a small vessel filled with fresh water is introduced into the cage, and left there for half an hour, and is then taken away. By this plan they obtain sufficient, and live longer and healthier than if allowed to have water constantly. As they breed in confinement, it is well to know how to distinguish the sexes. To a casual observer they are so alike that

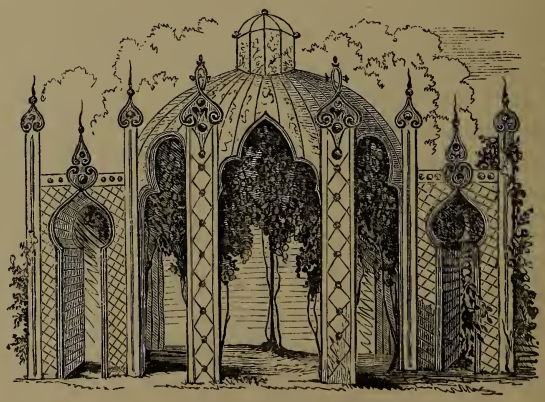
this seems impossible, but the male may be known by the blue cere or fleshy appendage of the nostrils, that of the female being white. To induce them to breed, introduce a box with a small orifice, or a rough dry husk of a cocoa-nut with a hole at one end, and screen this from view. When kept in an aviary the best nesting place is a hollow stump of a tree partly hidden from observation, as they are extremely jealous of privacy, and will never hatch out their eggs if interfered with, or subjected to frequent scrutiny. These birds appear to be fast becoming acclimatized in this country, though we must not be misled by reports of the annual appearance of flocks in company with sparrows in the Temple Gardens and elsewhere, for no one can aver that these are homebred birds, or that they breed with us as wild birds at all: they may be indeed only aggregations of birds escaped from cages, and they are so sociable in disposition that they have but to meet and they remain constant friends for ever. To teach them is almost out of the question, yet we once succeeded in teaching one to play on the wires of its cage as on a harp, and a very comical performance it was, mingled with voluble warblings and harsh chitterings. Another bird quickly learned to imitate the song of a canary that was mated with it, but as the parrakeet improved in the performance the canary degenerated, and came at last to mingle the other bird's harsh chitterings with its own proper music.

Although we intentionally avoid the exhaustive treatment of the subjects that come before us in these pages, we cannot close this chapter on parrots without a brief notice of the interesting experiments of Charles Buxton, Esq., M.P., in the acclimatization of parrots. It must suffice to say, that at the meeting of the British Association in 1868, this gentleman read a paper on the subject, in which he described the successful introduction of parrots, cockatoos, parrakeets, and lories, to the woods as wild birds at his residence in Surrey. The birds were simply set free, provision being made to afford them shelter at their own discretion, and a daily supply of food. We must qualify the term "successful," by observing that the birds would sometimes fly far away, even so far as fifteen miles from their proper home, and many of them were shot by gamekeepers, and that maundering class of "sportsmen" and "naturalists," who consider the beginning and end of human happiness to be the killing of whatever it is possible to kill. So far as adaptability to our climate might be a question for solution, it was answered completely, for the birds endured the winter's cold and the summer's heat; and this point, we hope, will have some

practical value for the amateurs who read this book, and who perchance have noted our objections to the hothouse treatment of parrots. Now let Mr. Buxton speak for himself, and close the chapter. He says:—"The experiment of acclimatizing parrots has been tried on a somewhat large scale. We have had African, Amazonian, and Carolina parrots; Rosella parrakeets; large Bengal parrakeets; four species of cockatoos, and two of lories. The last are magnificent birds, with their scarlet bodies, and very long wings and tail of rich metallic green. Curiously enough, however, they are far less seen than any of the others, as they almost always sit buried in the thickest foliage, and have none of the sensibility and intellectual excitement of the cockatoos or parrots. In fact, however, all these birds vanish completely out of sight during the greater part of the day. Many of them, indeed, live in the woods at a distance from the house, but even those who have selected the trees in the garden for their residence would not easily be discovered. You would have supposed that at any rate the white cockatoos would have been visible anywhere; but the inclination of all animals is to slip out of the sight of man, and, with the shadows of the trees upon them, an unpractised eye would rarely discover them. In the morning and evening they come to feed upon hemp seed and bread and milk, which is hung in a basket from a tripod; and then the groups of them are sometimes most beautiful. Lately we have had great losses—so many have flown away and been shot. But I will read a memorandum which I put down one day, a couple of years ago, of the scene I was watching, and which recurred morning after morning as I sat reading in my study at my house in Surrey. The parrots' breakfast having been put in the basket, a pair of white cockatoos, who had been anxiously watching the proceedings from the tree above, swooped down, and set instantly to work. A Bengal parrakeet, with long green wings, presently comes skimming up, and flutters for a few minutes almost perpendicularly in the air, exactly in the attitude so often represented by Mr. Gould in his book of the 'Humming Birds,' with the head and tail curved inwards, and the wings extended. Two or three rose-coloured cockatoos follow, and hang about on the tripod, but do not venture to take their places on the edge of the basket while their fiercer brethren are at work. But presently one of the huge white cockatoos with yellow crests comes swinging heavily down over the lawn, putting all the lesser ones to flight in a moment. But they soon gather round again, and a lory, resplendent in red and green, darts through the air and lights

on the top of the tripod, his burnished hues contrasting well with the pure white of the cockatoo below; and the group is completed by a Cornish chough, whose glossy blue-black plumage and orange beak and legs are not the least striking of their costumes. He always at once engages in a fierce strife with his rivals, and his long beak gives him the advantage over them.

A spectacle of this sort, which I have witnessed hundreds of times, is one of exquisite beauty, especially on a sparkling winter's morning with the snow on the ground, when the colours of the birds seem peculiarly gorgeous. Nor do they appear to be injured by the cold; the grey parrots have the sense to get into a house that was built for shelter to them, but none of the others can ever be persuaded to enter it, and they live in the woods the whole year through. But even last winter, when the thermometer in my neighbourhood fell 6° below zero, though one cockatoo unaccountably disappeared, all the rest appeared to be as full of life and spirits as possible. In fact, so long as birds are well fed and in good health, I do not believe that cold is fatal to them."



Parrot House in the Moorish style.

CHAPTER III.

SMALL BIRDS IN CAGES.

"Each day I listen'd to thy varied song,
Pleased with the labours of thy little tongue;
Sweet was thy song when morning shed its ray,
Sweet was thy song when evening closed the day;
When care oppress'd me, thou couldst bid it flee,
When friends were far, I found a friend in thee."

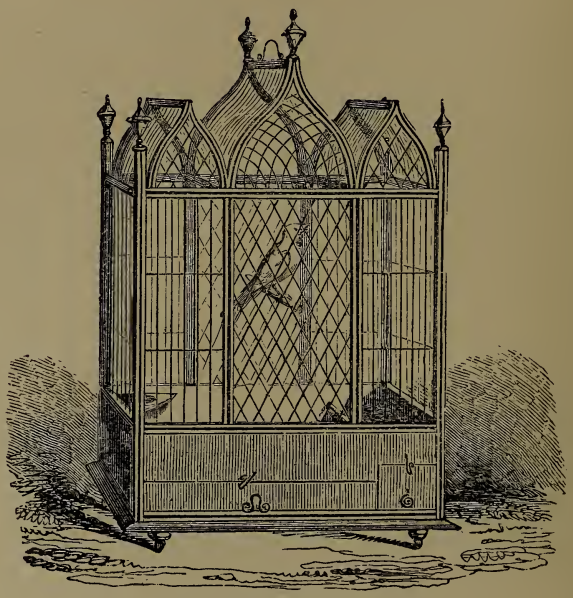
FAWCETT.

ONE of the great advantages of restricting the collection of small birds to finches and their congeners is that a most simple code of treatment will serve for all alike. To this advantage may be added another of no small account. It is that finches, properly taken care of, live long in health and cheerfulness, whereas soft-billed birds not only require much skill, and entail considerably more trouble than finches, but with the best possible treatment, there will always occur more losses with these than with those hardier and merrier songsters, to which for general purposes we give preference.

As we shall intentionally avoid entering into minute particulars where general observations appear sufficient, we shall dispose of the finches briefly, in order to find space for a few more detailed directions on the management of a few of the most desirable soft-billed birds.

FINCHES.—The selection of suitable cages for birds is a matter of the utmost importance. The finches are all lively, restless birds, and require, therefore, room enough for exercise; but, as a rule, if allowed more than sufficient space for tolerably free movement they do not sing so well as when somewhat

restricted in regard to locomotion. Elegant birds deserve elegant cages, but a mistake may be very easily made in the desire to secure "something pretty;" and in truth a considerable number of the fancy cages displayed for sale at the shops are unfit for any useful purpose. After trying cages of all kinds we have pretty well settled for ourselves that well-made constructions of wood and wire, with a small amount of the most sober ornament, are far preferable as a rule to those made of perforated metal, which are usually decked out in



Canary Cage for Parlour.

gaudy colours. Such a cage as that represented above, from Bechstein, is to our taste fanciful enough for any bird; but we are now content to keep canaries in cages with flat tops, and as plain otherwise as wood and wire boxes can be. Whatever the sort of cage, it should be sufficiently substantial to stand the wear and tear of daily use, all the parts fitting well, so that the necessary operations of cleaning and feeding may be carried out without vexation or accident. There is one disadvantage in having wood cages, and that is,

that if vermin once obtain a lodgment the wood is favourable to their multiplication to the injury of the birds. But whoever saw or heard of vermin in birds' cages except in the houses of people who ought never to have attempted keeping a pet of any kind, not even a cat? Vermin follow close upon filth and neglect. They are plagues unknown to the cleanly and orderly, who treat their pets with the consideration due to sentient beings deprived of sweet liberty. Cages made entirely of metal certainly afford no lodgment for vermin, and that is the only argument we can adduce in their favour. On the other hand they are cold, and in winter weather may be really injurious, both because they are usually made more open, and therefore expose the birds more to draughts than wooden cages, and also because some birds will sleep on the tray instead of the perch, or play about in their sand at times long enough to have their feet cramped. We present a few illustrations of fanciful cages, because like other things they have their uses, and when new and bright are certainly very attractive.

Before dismissing this subject we would remark on a risk that accompanies the use of the "Zollverein" cages, as they are called, one of which is figured at page 179. These cages are well made, and will last for many years in good condition, save and except in the wretched little hooks, by means of which the framework is attached to the tray. Some day or other these hooks are sure to fail in operation. Perhaps at feeding-time they may be slipped into their customary places carelessly, and the fidgetting of the bird may cause the tray to fall on one side, leaving a great gap, through which perhaps the bird escapes by the open window. We have found large cages of this kind well adapted for grass parrakeets in summer, though too cold for them in winter, and we used them until this risk became apparent; and when we had contributed our quota of parrakeets to the flocks that haunt the London squares, we gave them up, and for several years past we have only seen our Zollverein cages in the lumber room.

To say that birds of all kinds should be kept scrupulously clean should be unnecessary. Alas! that it must be said, for how often do we see the poor prisoners pining in the midst of dirt, their feet gouty and their feathers matted, as if they were playmates of the street Arabs. Pure water, clean sharp sand, and suitable food should be supplied daily, and at frequent intervals the food should be varied slightly, especially in the matter of vegetables. A good general mixture for finches may be made by mixing two parts of canary with one of rape and one of poppy seed. Canaries will thrive on canary seed

alone, with occasional scraps of lettuce leaf, watercress, and groundsel. Observe the birds' habits, for they differ in their tastes, and must to some extent be individually humoured. Bechstein recommends *crushing* the seed, which is quite unnecessary, except in rearing young birds, and that subject belongs to the bird-book proper, and not to this collection of sketches. He also recommends "a little crushed hemp seed," but this we object to, though hemp seed may be given, a very few grains at a time as a treat, and is quite a talisman in the art of taming.

What we have said about hemp in the feeding of parrots, applies also to small birds; it is too nourishing, it tends to create fatty degeneracy of the heart, and a distaste for other less stimulating food. Even rape seed may prove injurious if given to excess, though bullfinches and linnets will live on rape alone. By avoiding the customary use of stimulating foods, they become valuable as restoratives, and a little hemp given daily when a bird is out of condition, especially in cold weather, will do wonders. An excellent accompaniment of the ordinary seeds is the French bread known as *colifichet*, a piece of which may be thrust between the wires. Groats and Indian millet may be given to all kinds of finches, and canaries especially. Thus the staple food may be varied, but canary should be the leading article; it is wholesome, nourishing, and suits all appetites. The best rape is that known as "German," or "bird turnip" seed. Almost any of our table vegetables may be given as the seasons bring them into use, and it is well to accustom the birds to vegetable diet of some kind or other all the year round, for if kept without it for any length of time, and then supplied, they are apt to eat greedily, and injury to health is the result. One of the most wholesome treats at any season of the year is a complete plant of groundsel, including the root, with a few crumbs of earth adhering. Although the sand in the cage may be clean, they will generally enjoy picking a few particles of grit from the root, and be doubly benefitted, for it affords them amusement as well as material nourishment and needful medicine.

In the books will be found long catalogues of diseases to which birds are subject. Finches fairly attended to will rarely be out of health, and we need only refer to two of the most common ailments. Diarrhœa may result from neglect, the water perhaps has become stale and impure, and the bird being compelled by thirst to drink it, imbibes poison. The greedy eating of green food will bring about a similar result. In such a case pay attention to the food, that it be pure; do not give the bird sweets or any kind of dainties.

Crumble into the water a few grains of chalk, keep the patient warm and quiet in a room partially darkened, and it is likely to recover. Costiveness may generally be cured by means of flax seed, and a very little boiled bread and milk. The state of the sand will indicate surely enough to observant eyes if the bird is affected by either of the two maladies we have thus briefly considered, but the behaviour of the bird itself will afford a hint of something wrong; and to those who love their pets and would do justice to them, not only as property, but from motives of genuine kindness, a hint will generally be enough to beget earnest watchfulness.—

"The sweetest voice
That warbles in the grove, is not so sweet
As thine, Compassion—nor the boldest deed
Of heroe's arm so worthy of the lyre,
As act of Mercy; nor, in all the round
Of being, is there aught in God's pure eye,
So bless'd, so sanctified as those kind thoughts
That stir the bosom of Benevolence."

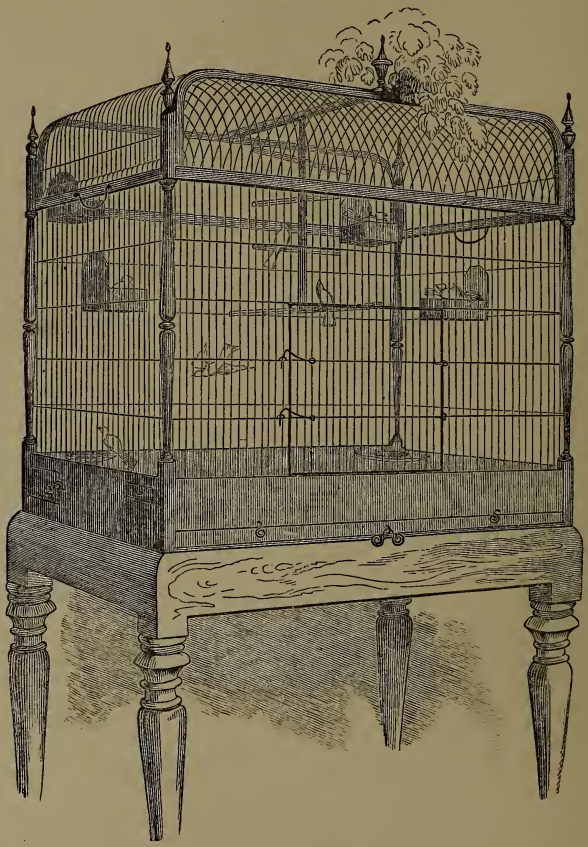
DRUMMOND.

In the selection of house birds the canary will generally have the first place. There are many breeds, and fanciers have their favourites, but the German birds are as a rule the best, though sometimes too loud in song for a small apartment. *Chacun à son goût.* The attenuated Belgian birds are delightful companions, when you get used to them, but to a novice they appear starved and deformed. On this part of the subject the beginner will derive valuable assistance in a most delightful manner from a perusal of the Rev. Francis Smith's entertaining book on "The Canary," where also all the mysteries of the pleasant pastime of rearing canaries are fully explained. A breeding-cage inhabited by a faithful pair,

"In truest bonds conjoined for weal or woe,"

is as good a household toy as will be found amongst a thousand. The interest that young people take in their welfare should commend such a toy to the domestic circle, and the stern utilitarian may see in it an instrument in aid of education, the introduction to the fireside of a lively scrap from the book of nature, from which better lessons may be learned than from the best of Latin grammars or solemn treatises of physical science. Happily, too, this pastime is not recondite; the birds will arrange their domestic affairs in their

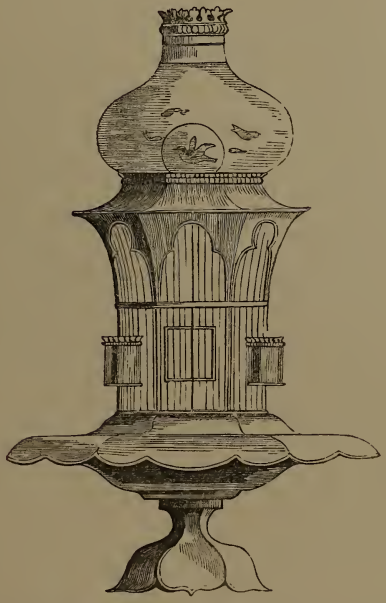
own way without interference better than we can arrange for them, but as they are prisoners, and cannot go abroad to make their purchases, the preliminaries must be determined with prudence and good taste.



Breeding Cage.

The best time for pairing canaries is April, and the male should be not less than two years old. Good attentive males are not easily obtained, and attentive and assiduous dams are not so plentiful as might be wished. Some will lay without sitting, some will pick their own babes to pieces, and some

are so bad as not to be worth keeping at all. The cages ordinarily sold for breeding canaries are much too small. You cannot rear healthy children in courts and hovels, and even birds want breathing-room. There should be sufficient space for flying as well as hopping about, and hence better birds are bred in rooms, or in an aviary properly fitted for the purpose, than in any kind of cages. Another objectionable practice is the removal of the eggs as fast as they are laid; the custom is opposed to the course of nature, and



Zollverein Cage for Canary, and Globe of Goldfishes.

it is a positive cruelty to give the poor hen a series of ivory eggs to brood over till she has ceased laying. The eggs are injured by removal, and when given to the hen all together, exhaust her by too sudden an abstraction of vital heat; and again, instead of the chicks coming into the world one at a time successively, they are all hatched at once, and the anxious parents have half-a-dozen helpless babes to provide for suddenly, instead of their parental cares increasing as ours do—or as we hope them to do—by one at a time.

There should be more nest-boxes than couples where they are bred in an aviary, so that the hens may have a choice, otherwise they are apt to quarrel for shady corners. A fir growing in a tub affords a good shelter for canaries to build in, and if one is supplied them they seldom use the nest-boxes.

> Our laws are our feelings, which prompt us to show
> Affection to all that inhabit below.
> From my mate is ne'er heard the harsh word of command;
> But a look, always kind, is the wizard's sole wand.
> Son of freedom himself, he's the friend of the free,
> No constraint could be pleasing to him or to me.

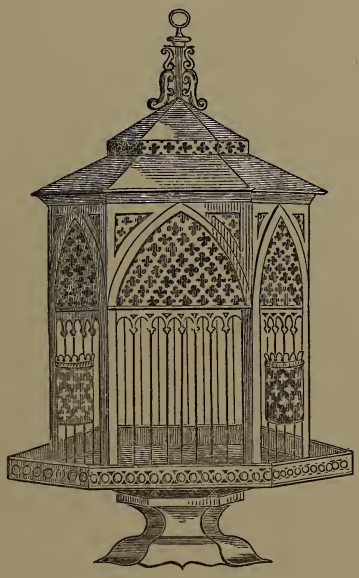
Foreign Finches have the peculiar claim upon us that we have already urged on behalf of all foreign birds that may be kept without difficulty in cages; moreover, they usually entertain us with more brilliantly-coloured plumage than we are wont to meet with amongst our native birds, though we are inclined to match the brave kingfisher, and the tiny fire-crested wren, and the homely robin, for beauty at least, against the best of them.

The Virginian Nightingale is one of the most beautiful of the race of cardinal birds, and it is peculiar in this respect that the female sings nearly as well as the male, so a mistake in purchasing is not necessarily a disappointment. If we were to say that it equals the English Nightingale or that it is a nightingale at all, would be simply untrue. It is indeed a finch, and that is one of its recommendations. It is best kept in a rather large cage, but will live peaceably in an aviary. It may be allowed to fly about the room at convenient times, and may be petted to any extent without being spoiled, a quality in which he far surpasses some of the "lords of creation." The Virginian Nightingale requires a variety of food, and should have by turns buckwheat, hemp seed, maize, steeped as advised for parrots, slices of apples, now and then an almond, a mealworm or a caterpillar. The staple food, however, should be canary seed, and when the extra dainties we have named are not at hand give him a taste of whatever you have on the table, provided it be neither salt, nor sweet, nor greasy.

The Nonpareil or Painted Finch is a splendid bird, with a violet hood when in his best trim, but at all times gay, with green back, throat and chest bright red, and green wing coverts. He sings in winter, the song being such as we might describe as that of a subdued robin, but more prolonged. A sociable, tameable, fly-about bird, thriving upon canary and millet with the help of occasional innocent scraps.

The Indigo Bird, or L'Eveque of the French, so-called because of his bishop's dress of violet, is a most amusing creature, which may be trained to fly about the room. His song is nearly as good as that of the linnet, but not quite. Canary and millet will afford the best of nourishment, and a few hemp seeds will assist the bird in moulting and during cold weather.

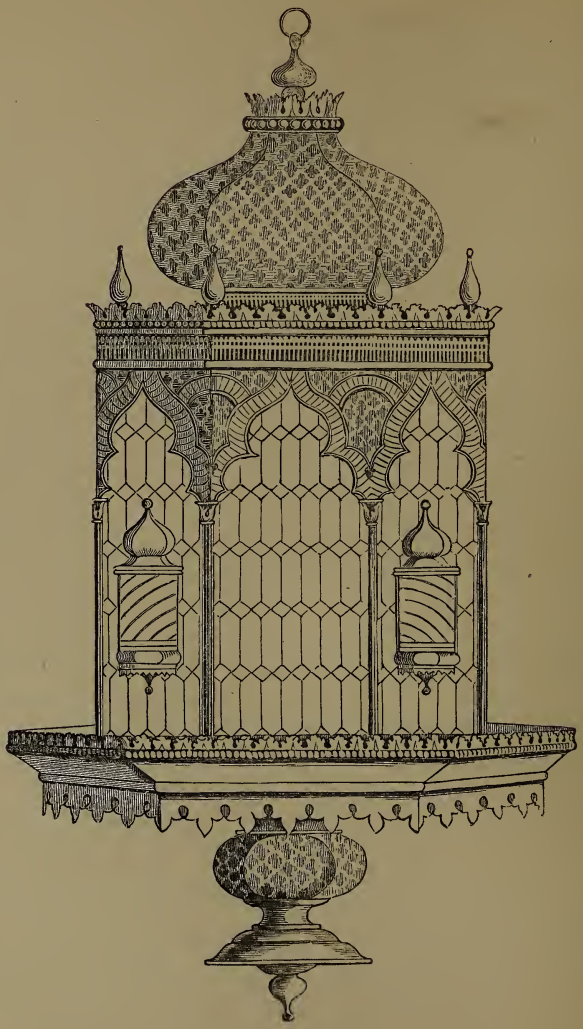
The Java Sparrow is fortunately a true finch, and therefore easily kept. This bird is the best known of all the feathered foreigners that are kept in



Coloured Cage for a Siskin.

cages. We have heard them described, and not inaptly, as beautified bull-finches; they are most amiable, and thrive best when kept in pairs, either in cages or in an aviary. As to food, we can but repeat the old story of canary and millet. As to song, they have none, but they utter a few monotonous notes which can never offend any one, and their pretty ways commend them.

The Waxbills and Avadavats, or Amandavas, are like little angels that have lost—no, not lost their wings—but their heavenly state and immunity from death. A cagefull of them will assuredly suggest a lot of cupids in



COLOURED CAGE FOR GRASS PARRAKEETS.

a crate, and Thomas Moore, Esq., ought to have written a song about them. A most sweet small chirping and singing will such a cagefull make, like children playing at school in the sedatest mood possible, and without the shadow of a suspicion that any eyes but their own behold their pretty play. The best food for them is millet and canary. Bechstein says, speaking of

Aviary Cage.

waxbills, "their beautiful shape, their amiable disposition, and the affection which they show to every one indiscriminately, render them such favourites, that a dozen may be often seen in one cage. Their song is scarcely anything." A good cage of waxbills and avadavats is one of the best of drawing-room ornaments.

The Manikin, of which there are several varieties, are to all appearance most proper companions of waxbills and avadavats, but are too quarrelsome to be kept with them. Canary and millet, as before, are the staple foods.

The Tanagers are a large family of American Finches; the best of them is the "organist," a fine full-toned bird, which almost deserves its high-sounding name. As before, canary and millet, and table treats dispensed with prudence.

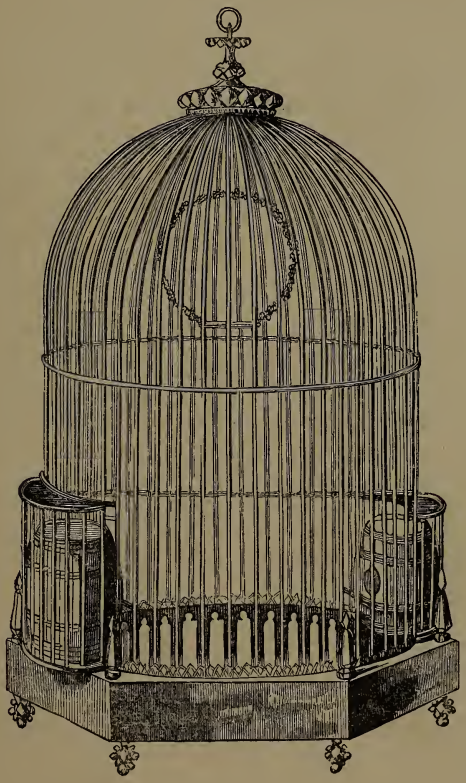
Many more foreign birds deserve attention, but to name a few of the best is better than compiling a catalogue—at least for our purpose. The large aviary cage represented on page 183 forms an admirable home for a collection of showy foreign birds of small size, and if well furnished is a noble adornment for a drawing-room. It is moreover the very best form of aviary cage extant, sufficiently ornamental and thoroughly serviceable, affording abundant space for the free movements of its inmates, and for the full enjoyment by the spectator of their gay colours and merry pranks.

> The heart has tendrils like the vine,
> Which round another's bosom twine:
> Outspringing from the parent tree
> Of deeply-planted sympathy,
> Whose flowers are hope, its fruits are bliss;
> Beneficence its harvest is.
>
> BOWRING.

WARBLERS, as we have said many times already, are more difficult to keep than finches. In their wild state their food consists almost entirely of insects, and it is not an easy matter to provide a good substitute for their natural diet; moreover, as most of them are migratory, they are subject to the operations of an instinct on the recurrence of the season of migration, which renders confinement increasingly irksome to them, so that it is no uncommon thing for them on those occasions to die of grief! Moreover, as migratory birds for the most part pass the winter in warmer climes than ours, they are more tenderly constituted than constant residents in these islands, and for that reason need peculiar care during the winter season. The amateur must bear these matters in mind at the outset, and for his comfort and encouragement he may take the assurance that perseverance and kindness will overcome all difficulties, as they have done again and again, so that to hear nightingales sing on Christmas Day in a warm room is not altogether a rare occurrence, though far from common.

As it is not intended here to treat of cage birds at great length, we

must say but little on the treatment of warblers, because comparatively few of our readers will care for copious information. In the standard books on the subject various pastes are recommended for soft-billed birds, and without question some of them answer well. One leading direction is to prepare the



Kidd's Fairy Bird-Cage.

food daily, because of the rapidity with which it becomes sour, and therefore hurtful. When our collection was at its best, the preparation of food daily was found to demand more time than could be afforded, and we were constantly experimenting on rough and ready methods, with a view to lessen

the labour without harm to the birds. We found that a dry mixture which could be moistened as wanted, without any cooking process, could be employed, and the preparation at last adapted was made as follows:—About a pound of stale bread without any crust, grated fine; two ounces of moist sugar, two ounces of grated cheese, and a quarter of a pound of coarse oatmeal. These ingredients were thoroughly mixed together, and put into a glazed earthen jar and shut down close. At feeding time a sufficient quantity was moistened with milk and given to the birds; occasionally a little scraped beef or mutton with a few crumbs of fat, or an egg boiled hard and minced fine were given, and were always relished. All these birds will take insect food readily, and indeed will not thrive long without it, therefore a regular supply of meal-worms must be secured, and as opportunities occur they should be supplied with ants' eggs, (*i. e.* the larvæ from an ant-hill,) spiders, small beetles, cockroaches, wood-lice, and indeed any insects of suitable size that can be captured. A capital food for a nightingale or black-cap, is boiled bullock's liver, and, failing that, the liver of any other animal. In common with all other food, it must be given in a finely comminated state, and if there are many birds to feed, a mincing machine will be found a valuable help in saving time. A little grated carrot may be mixed with it, or may be given alone, and this again may be varied by small supplies of any kind of boiled vegetables or soft puddings. German paste is not to be despised, but as a rule the birds must be *taught* to take it, for they rarely touch it until coaxed to it by mixing it with raw beef. In all cases the stringy parts should be removed before the meat is minced.

It is very important to select proper cages for the soft-billed birds, as they are somewhat secluded in their habits, and need more shelter than finches, owing to their comparatively tender constitutions. The smaller attentions prescribed in the books must be bestowed sedulously. Pure water, clean sand, insect food regularly, fresh turves for larks, and as much fresh air for all as the state of the weather and other circumstances will allow. The only bird of this class well adapted to be made a thorough pet of is the robin. We soon train one of these to fly about the room, and to return to his cage towards evening for a meal-worm; when thus treated a robin is a most amusing pet. He will alight on the dinner-table and help himself. He will bathe in a bowl of water and dry himself at the fire, and wanting the bowl of water will actually go through the performance of the bath on the top of a cold earthenware jar, spreading out his wings and tossing imaginary drops of water

over his back. After that he will fluff himself out as if wet, and perch on the front of the fender to dry himself. To witness this procedure is a good substitute for the performance of a farce, or rather it is a farce provocative of laughter, without the fag of the theatre or the wasteful cost of a bill of the play.

Glorious as is the song of the thrush, it is not a nice bird to keep; nor is the blackbird; nor indeed are any large birds that live on soft food. But these large birds may be kept with more certainty than the small warblers. Give them all they need, plenty of good food and water, a bath regularly, and bear with all their splashing, and spluttering, and mess, and you will have music for your pains. The general paste answers well for blackbirds and thrushes. Where it may happen that one of these loud songsters is the only bird in the house the preparation of a complicated mixture may be avoided, for the coarsest oatmeal, (or "round meal,") moistened with milk, is an excellent staple food for them. Fine oatmeal will not do so well as the coarsest that can be got. This may be supplemented with soft crumbs of bread, scraps of meat free from skin or sinew, and occasionally a bit of cheese or apple. When cleaning out a blackbird's cage, it is a good plan to have a second cage at hand containing the bath only. Bring the cages together, and the bird will hop into the one containing the bath. Shut him up to bathe and splash while his own proper cage is made ready for him, and then allow him to return. By this method of procedure cleanliness and comfort are greatly promoted, and the bird perhaps spared a terrible amount of injurious fright and fluttering. Birds newly caught will be greatly assisted by this system of replenishing their cages. Those who write on bird-keeping are too apt to conceal part of the truth, in order to magnify the pleasures of a pursuit which is inevitably accompanied with difficulties and vexations.

Though we have but glanced at the subject, we trust we have clearly set forth a few points of practice that will be useful, especially to those who are minded to pursue the matter with detail by the aid of books and observation. We repeat, as we began, that the caging of our native birds can only be justified by subsequent care of them. If they are caged to suffer, the world is robbed of their beauty and song to no purpose, and the attempt to gratify a private feeling culminates in a public wrong. Those who keep cage birds are bound by every imaginable obligation to do complete justice to them, that their lives may be rendered as happy as their changed circumstances permit, and their days be extended to the longest span compatible with their state of captivity.

Over the entrance of every birdroom should be inscribed as a warning Cowper's lines "on a goldfinch starved to death in his cage."

Time was when I was free as air,
The thistle's downy seed my fare,
  My drink the morning dew;
I perched at will on every spray,
My form genteel, my plumage gay,
  My strains for ever new.

But gaudy plumage, sprightly strain,
And form genteel were all in vain,
  And of a transient date;
For caught and cag'd, and starv'd to death,
In dying sighs my little breath
  Soon passed the wiry grate.

Design for Aviary.

GROUP OF FOREIGN FINCHES.

THE AVIARY.

At distance far, concealed in shades alone,
The nightingale poured forth her tuneful moan:
The lark, the goldfinch, warbled lays of love,
And sweetly pensive cooed the turtle-dove;
While honey bees, for ever on the wing,
Hummed round the flowers, and sipped the silver spring.

THEOCRITUS.

VIARIES are expensive luxuries, and those who contemplate adding one to the number of their recreative resources are earnestly advised to first count the cost. By counting the cost, more is to be understood than a consideration of pecuniary means to command a luxury. There are many who in an excess of affluence and under the influence of an unfounded suspicion that they possess some judgment and taste in rural pursuits, enter upon undertakings only to experience bitter disappointment and the disgrace that accompanies failure. It is difficult to sympathize with the pretentious when their schemes collapse, and the difficulty is insurmountable when the "means to pay" have been thought more of than the professed object of the outlay. But that is not the only question. We may waste our money

in constructing and furnishing an aviary which may prove a miserable failure, but what does the failure imply beyond our loss? It implies a sacrifice of life, aye, and of innocent life, that might have been a service to mankind and a tributary to the beauty and gladness of nature. We shudder to think of the mischief done by people who make the means to pay their vulgar boast, and who by their utter destitution of taste and knowledge, fail in everything they touch except it may be money making.

But come, good reader, you have our mind on the preliminary consideration, and you see to what it leads. No one should set up an aviary until after having acquired some amount of experience in the management of birds; but when experience has been gained, this delightful extension of the study will abundantly repay its cost, and constantly increase in interest as the possessor becomes familiar with its duties, and learns what pleasures to anticipate while enjoying those that pass. The free bird warbling in the leafy grove makes an appeal so pure and strong that the heart responds in joyous thankfulness, not only because he sings, but because he is free. But we may not all be permitted to "hear a thousand blended notes" under the shade of oak and aspen boughs, and the aviary must afford us as near an imitation as can be secured of the pleasures which Wordsworth has so simply and sweetly suggested in his plaintive poem on the songs of spring:—

The birds around me hopp'd and play'd,
Their thoughts I cannot measure,
But the least motion which they made,
It seemed a thrill of pleasure.

The budding twigs spread out their fan,
To catch the breezy air;
And I must think, do all I can,
That there was pleasure there.

There are many kinds of aviaries, but we have only to consider here such as may be properly regarded as extensions of the birdcage and the birdroom, intended not for eagles or golden pheasants, but for small birds solely, for song birds chiefly, and for daily resort and entertainment, far more than for scientific study or mere display.

Let us consider the primary conditions of success. Whatever class of birds are placed in an aviary, they must be secured against extremes and sudden alternations of temperature; have abundance of fresh air, without being

subjected to destructive draughts; be proportioned in number to the space assigned them for exercise, so that, to express our meaning roughly, they may have plenty of room; and they must be so assorted that they will be likely to agree. A small quarrel occasionally will happen in the best-regulated aviaries, but there must be no persistent fighting, no persecution, no cultivated hatreds; the bird that plays the tyrant over much must be removed, to expiate his crimes in the confinement of a cage. Lastly, there must be security against vermin, of which cats and rats are the most to be feared. A hard floor and good fastenings will pretty well suffice for this. But a hard floor is valuable beyond the exclusion of vermin, because of the ease with which it can be kept clean by means of water alone. Ornamental tiles are of course admissible and desirable, but concrete will suffice, or the common red "foot tiles" commonly used for paths in greenhouses. These are thoroughly serviceable, have a neat appearance, are easily kept clean, and no rat can make its way through them.

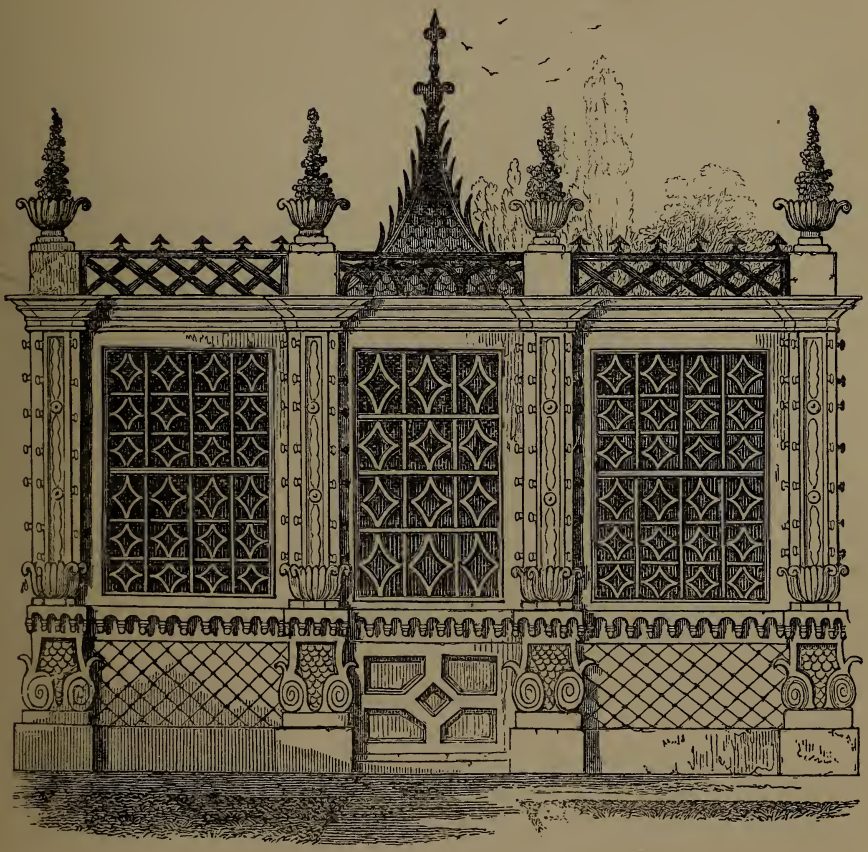
The very first condition, as we have enumerated them, precludes the employment of any small conservatory or greenhouse as an aviary, unless means are resorted to in the first instance to secure an equable temperature, and security to the inmates from extreme heat in summer and extreme cold in winter. Though the birds adopted may be the hardiest in the world, they cannot endure in confinement the hardships incident to their lot when free. The wild bird is strong, and has many resources: it can choose its food, its cover, and its country. When the hills refuse to feed it, the valleys may afford a welcome. Confinement diminishes native vigour and blunts natural instinct; but the prisoner has no choice of his lot, however much or little he may be able to judge what would suit him best. The question of temperature is of the utmost importance, therefore, in the determination of the site and the construction of an aviary. Nevertheless, it may often happen that the possessor of a glass house, or so-called conservatory, may prefer to keep birds in it than to grow plants, and so we will briefly consider this case.

A conservatory opening from one of the rooms of the house offers an admirable opportunity of increasing the number of domestic pleasures. Instead of the usual glass door, we must provide a door with a substantial framework covered with wire of the largest mesh possible, to afford a free view of the inmates of the aviary while keeping them thoroughly secure. Several of the side lights, say one half at least, should be adapted to be removed entirely during the summer, and to hang on hinges at other times, to afford ventilation

as may be required. These ventilators must be covered within with wire netting, so that when removed or opened they will be as safe as when closed. If it happens that the roof has sliding lights, one or two of them, in proportion to the size of the house, should be similarly covered with wire, to allow of the glass being drawn down in hot weather to allow escape for heated air. A few large evergreen shrubs, such as camellias, oranges, and a central perch reaching nearly to the roof, may be provided by planting a dead tree with the branches shortened. A perch should be carried round the house about two feet from the roof, and *one* only, for several reasons. A few secluded spots should be provided, both for birds that love to retire to places adapted for meditation, as also for the shelter of tenants newly introduced, who may have to run the gauntlet of a challenge all round for the first few days of their occupation. Of feeding hoppers and drinking troughs and fountains we have nothing to say; the "exhaustive" treatise will be found to deal with such matters sufficiently. But it may be well to add here, that nesting boxes and provisions for rearing birds in an aviary should not be thought of. We do not say that nesting is out of the question altogether, but the beginner would do well to consider it an impossibility, and in that view of the case, male birds alone should be selected for stocking an aviary. If pairs are allowed, fighting will follow. The spirit of mischief will seize the whole community the moment Love unfurls his banner, and whispers amongst them that domesticity is at their mercy for weal or woe. Their decree will be, "woe to it," and the hopes of the enthusiastic owner will be nipped in the bud.

In constructing an edifice expressly as a house for small birds, the requirements of success specified in the early part of this chapter may be more completely secured, than by any adaptation to the purpose of an existing edifice. And here it may be remarked with advantage, that a comparatively costless structure may be made to answer admirably as a *summer residence*, the birds being transferred to cages in the autumn, or to a warm room fitted up as a winter aviary. This kind of aviary is, in all essential particulars, a large cage, fixed or moveable, occupying a suitable spot in a garden or on a verandah walk. Our coloured plate of such a cage will suggest a style of decoration; and there need be nothing said about interior fittings, for a very moderate experience in bird-keeping will suffice to guide the amateur in this part of the business. Perhaps the best known examples of this kind of aviary are those in the tropical department of the Crystal Palace, which are judiciously furnished and admirably kept. Any one of them equally well managed would form a delightful

embellishment to a shady secluded court or verandah during the summer, and might be removed, without removal of the birds from it, to a warm conserva-



Design for Garden Aviary.

tory during winter, and there prove as valuable as previously it had been out of doors during the summer.

Remembering that for a permanent structure some means of providing an equable temperature in summer and artificial heat in winter are absolutely

necessary, we should prefer to adopt a rustic design, if the position and the surroundings would admit of it, in order to have a roof of thatch, and to provide for heating in winter by means of hot-water pipes. Where there happens to be a range of hothouses, or forcing pits, there may be no difficulty in connecting an aviary with the boiler by which the plant-houses are heated, but if the aviary is to stand alone and be independently heated, the plan must be bold and comprehensive, or it will end in failure. The house must be large, and must have the aid of a good upright conical boiler, and a service of four-inch pipes. A small house, standing alone, will be too much influenced by sudden alternations of temperature, and disasters will result therefrom in the height of summer and the depth of winter. Moreover, the heating of a small house is a vexatious business, and flues and fireplaces are out of the question,—it is absurd to make a birdhouse an imitation of a human dwelling, either within or without. The portentious difficulties we present to the consideration of the reader, may in great part be evaded by making the aviary an attachment to the dwelling, with immediate connection with some of the principal apartments. One of the advantages of this plan will be comparative immunity from extremes of temperature, as the intense summer heat can be screened off without difficulty, and the aviary will derive great aid from the solid walls with which it is connected, and perhaps also from other available aids in resisting the frosts of winter. Indeed, direct communication with apartments kept constantly heated throughout the winter may be sufficient for the perfect preservation of the collection, and render unnecessary any special heating apparatus. The pretty cottage in which our late lamented friend, Mr. William Kidd, of Hammersmith, kept his large collection of song birds, was the very type of structure to be avoided, because of its small power of resistance to extremes of temperature, owing to its complete isolation and being almost wholly constructed of wood. A roof of thatch, and a few trees to give shade and shelter, would have improved it much; but, as remarked above, an aviary need not be formed on the model of a human dwelling, for a design approximating thereto is apt to mislead.

After all, however, the general plan of the house is of little consequence provided it fulfils its purpose. Birds love light and air, but burning sunshine and biting winds are enemies of their health and peace: sufficient warmth and shelter, with protection against vermin, are matters of the utmost importance, and therefore the aspect, the design, and the interior fittings, must all be adapted to secure these desiderata with the utmost possible certainty at the

smallest possible cost. A fully-exposed position facing either due south or due north would be quite unsuitable, but any aspect except due north may be made suitable with the aid of trees to give shade in summer, and in the case of an east aspect, shelter against the terrible blasts of spring. A south-east aspect, with the shelter of a building or a shrubbery on the north-east, would, *cæteris paribus*, be the best, all things considered, especially if the owner would like an early song in the pleasant days of spring. The design at page 193 represents a frontage in the Chinese style, admirably adapted to a snug thatched-roofed aviary. The compartments are of course filled in with wire-net, and in winter these are covered with heavy sashes, constructed so as to admit sufficient light, but as far as possible to contribute to the preservation of an equable temperature.

The coloured plate represents a group of small birds in an aviary. The beautiful Virginian Nightingale occupies the centre of the group on the topmost branch, in his favourite position for singing. To the right of this is the pretty Snow Bunting; to the left, on the wing, just above the Nightingale, is the golden-hued Brazilian Finch, immediately below which is the dapple-breasted Queensland Waxbill. Immediately below the Nightingale stands the sturdy Blue-headed Tanager. The vivacious bird with outstretched wing below the Tanager is the Oriole. At the foot of the plate is the American Robin.

LIST OF SMALL BIRDS ADAPTED FOR AVIARIES.

In a few cases the scientific names are added, those being preferred which are in general use, and most likely to be needed for purposes of identification. The species marked thus * are most to be desired, especially by beginners.

FINCHES.—The Canary,* Siskin,* Linnet,* Redpole,* Twite or Mountain Linnet, Yellow Ammer, Goldfinch,* Java Sparrow,* Nonpareil, *Emberiza ciris;* American Goldfinch, *Fringilla tristis;* Saffron Finch, *Sycalis Braziliensis;* Paradise Whydah, *Vidua Paradisea;* Scarlet Tanager, *Tanager rubra;* Malacca Grosbeak, *Munia malacca;* Virginian Nightingale, *Cardinalis Virginialis.**

The following constitute a pretty group for a drawing-room, if kept in such a cage as the one figured on page 183. They may also be kept with other birds in an aviary:—

African Silver-bill, *Munia cantata;* Spice-bird, *Munia undulata;** African Waxbill, *Estrelda cinerea;** Orange-cheeked Waxbill, *E. melpoda;** Zebra

Waxbill, *E. sanguinolenta;** Australian Waxbill, *E. temporalis;** Amandava or Avadavat, *E. amadava;** Fire Finch, *E. minuta;* Cordon Bleu, *E. phœnicotis.** All these birds need warmth, and it is advisable to provide them with small boxes or baskets lined with loose thick flannel: into these they will creep for shelter on cold nights. As they are absurdly fond of bathing, and will splash the water about to their injury in cold weather, drinking vessels should be provided of a form which will allow of them to drink, but prevent anything like immersion of their delicate bodies in the chilly fluid.

Warblers.—Nightingale, Blackcap, Whitethroat,* Redstart, Babillard, Wood Wren,* Willow Wren, American Robin or Blue Bird,* Goldcrest.

Thrushes.—Song Thrush, Redwing.

Larks.—The Skylark may be kept, but the Wood Lark alone can be recommended.

Parrots.—The Red-cheeked Nymphicus, *Nymphicus Novæ Hollandiæ*, is one of the most amiable of aviary birds. The Budgerigar, Brazilian Love Bird, and African Love Bird, are also suitable.

Design for Aviary.

Part II
ADORNMENTS of the GARDEN
THE CONSERVATORY.
THE FERN HOUSE.
THE APIARY.
THE PLEASURE GARDEN.
THE FLOWER GARDEN.
THE OUTDOOR FERNERY.
THE ROCKERY AND WILDERNESS.
WATER SCENES.
THE SUMMER HOUSE.
MISCELLANEOUS GARDEN EMBELLISHMENTS.

THE CONSERVATORY.

Who loves a garden, loves a greenhouse too.
Unconscious of a less propitious clime,
There blooms exotic beauty, warm and snug,
While the winds whistle and the snows descend.

* * * * * *

Yet just arrangement, rarely brought to pass
But by a master's hand, disposing well,
The gay diversities of leaf and flower,
Must lend its aid t'illustrate all their charms,
And dress the regular yet varied scene.

COWPER.

CHAPTER I.

THE CONSERVATORY.

A CONSERVATORY is to be considered an absolute necessity in connection with the "Home of Taste." It needs no vindication, for none will question its value, or doubt that wherever circumstances permit—we will not say favour—the establishment of such a luxury, there indeed it should be found. The

subject is a tempting one, and we shall have to practice a stern self-denial in order to avoid prolixity, and keep to the rule observed hitherto of touching the more salient points, and preferring to leave much unsaid that would properly have place in a systematic treatise. We have yet to find room within the limits fixed for this work, for ten several essays on as many separate subjects, and so we beg permission to commence business at once without further preface, begging the reader to imagine all the many agreeable things that might be said on the pleasures the conservatory and greenhouse afford by the beauty they cherish for us, and the flowery paths they open into the boundless fields of knowledge.

Conservatories are of many kinds. All the world has heard of a great one at Chatsworth, of a noble one at South Kensington, and of an ugly one in the Royal Botanic Gardens, Regent's Park. The Crystal Palace is a conservatory, and so is the little glass box of ten or twelve feet square, which hangs like a meat-safe on the rear wall of many a small suburban villa. The little conservatories we have disposed of in the chapters on fern-cases, having considered them in connection with the house rather than the garden. We are free therefore to speak of the conservatory proper, and shall first remark upon it, that when connected with the house it is of an immensely greater value than when separated from it, no matter by how short a distance. Better go round about by ways not usually considered proper, as through a kitchen, a storeroom, or even a scullery to reach the conservatory, than have no other way of access than by a walk in the open air. But we do not advocate attaching conservatories to back entrances; all we mean is that as it is not always possible to place the structure where it should be for the most agreeable mode of access, it is well to consider before plans are drawn, if it be possible, even at the sacrifice of a few proprieties, to secure a way to it in the worst weather without encountering the damp and cold with which in this country we are too painfully familiar. We will suppose a lady to be interested in plants, and the happy possessor of a well-furnished conservatory. If it is far removed from the dwelling-house what a deprivation of accustomed amusement will a week of snow and frost, or of fog, rain, or blustering wind occasion! Or, on the other hand, what risk of health must be encountered by braving the storm, if enthusiasm should supersede prudence! Such an one would rather go round about, say through a kitchen or the gardener's shed, to get amongst her floral pets than not see them at all; and the grand way across the garden by which visitors are taken will be none the less grand because

of the additional convenience in view of bad weather and quiet times. We often see conservatories of the very best type as to construction and contents removed just far enough to afford no advantage by distance from the house, though enough to render them useless so far as to amusement in bad weather, or a dangerous temptation to persons of delicate health who take a constant interest in plants. A covered way, or glass corridor, is the best ordinary mode of establishing communications with the conservatory when it does not happen to be too far removed. If a sufficient space for this be granted, it becomes an addition to the conservatory itself, and may be made to answer admirably for camellias, orange trees, and other nearly hardy subjects, or it may be made a museum of curiosities. As a rule the best way to deal with a glass corridor is to form a border *outside*, and in that border to plant vines or other hardy plants suitable to be brought in and be trained over the roof. These give shade in summer, and offer no obstruction to light in winter, and if the place is not heated they suffer nothing.

Whatever the dimensions of a conservatory, or the particular taste of the owner, it should be so constructed that plants will not only live but thrive in it. Architects and builders have a fine talent for raising imposing glass edifices in which nothing will live that is worth the having. Ye who happen to be "in the hands" of any of these useful functionaries, beware! None but a grower of plants can fairly forecast in architectural lines all that plants require. The architect will perhaps design a temple with massive pillars and pediment, or a mosque with glass domes, and call it a conservatory. But if never a plant of any kind, except it may be of the kind known as "mildew," will thrive in it, what is the gain, or rather, what is the loss? Architects' conservatories are frequently met with, and almost without exception they are such as no plant-grower could ever attempt to grow a plant in, except under the compulsion of obedience to an employer, and that obedience strongly tinctured with an honourable desire to please. We could name many examples in illustration of the general unfitness of architects and builders to construct conservatories, but we forbear for reasons that will be understood.

As a rule, the larger the conservatory the better. This rule, however, must be seasoned with several grains of salt. A great cold place poorly furnished would not afford the gratification of a smaller structure well kept and showing abundance of

"Exotic beauty, warm and snug."

One good reason for building a large house is, that with proper heating apparatus,

it can be kept at a proper temperature in winter more easily than a small house; with proper ventilation the same may be accomplished with equal ease in summer. To put this consideration in a nutshell, the smaller the house the more is it subject to the alternations of temperature that prevail without, and the maintenance of an equable temperature is one of the most important aids towards success in plant-growing. As to the consumption of fuel, the larger the house the less is the cost proportionately; and the same may be said as to the cost of labour. We say nothing of the advantages of broad clean walks, a sweet moving atmosphere, and the nobler plants that are available for furnishing, except that if we are cramped for room we cannot have them at all.

A few other remarks demand attention yet. A conservatory should be substantial, elegant, and light. It is no difficult matter to put up shading, but it is impossible to let in more light than the unshaded glass will give. Therefore heavy pillars and cumbrous roofs are objectionable; given strength enough, and for the rest the plants should be exposed to the fullest possible intensity of daylight, or there can be no satisfactory results. The dimensions and the design must be to some extent determined by the owner, but the requirements of the case demand that the roof of every kind of plant-house should be no higher than needful for the plants it shelters and the comfort of its occasional human inmates. Regard it as a golden rule to make the roof as low as you dare, for lofty roofs have killed quite as many plants as any other particular folly in conservatory construction. Lastly, a good system of heating is indispensable. It is true, a few very fine plants may be kept in conservatories without the aid of heat in winter, especially when in close connection with the warm walls of a dwelling-house; but for weeks together these are cheerless places, and there is at least some risk of loss in the event of sudden and severe frost occurring when the plants are not yet as dry and dormant as they should be to endure it. For the heating there is nothing to be thought of but hot water, and if this part of the work is well done there need be no fear of loss in winter, and in the dullest days of the dreary season the winter garden will prove as tempting for its genial temperature as for its beauty and scientific interest.

The conditions imposed upon us by the scientific view of the subject—which is the only view to be taken if satisfactory results are desired—are quite compatible with all the requirements of art. We might multiply designs to any extent, but happily there is no need for them: the horticultural builders publish admirable plans and proposals, combining beauty of outline with facilities for

FACADE FOR A CONSERVATORY.

the most successful cultivation of plants. Here, however, is a design for a frontage to a conservatory, showing how a most fantastic façade of the Chinese pattern may be adapted to a ridge and furrow roof, (which in effect is a flat roof,) concealing the harsh lines of the roof itself without the smallest violation of propriety.

What shall we grow in the conservatory? As this book is not intended to dictate on matters of taste, the question cannot be answered. But it is our duty to advise, and we begin by saying that the best conservatory plants are such as have nobility of character, hardiness, and a power of duration—such as when skilfully grouped will furnish a beautiful scene: such as, if tended with reasonable care, will afford exhaustless interest and entertainment, varying with the seasons, and increasing always as time developes their several characters. The engraving at the head of this chapter affords a fair idea of our own views on the furnishing of a conservatory. It is, however, not a fancy, but a slightly modified sketch of the favourite plant-house of our esteemed friend J. B. Kellock, Esq., of Stamford Hill. Its contents comprise palms, yuccas, aloes, agaves, dracænas, dasylirions, beaucarneas, camellias, tree ferns, and other plants of like character, all of them so nearly hardy that if the house is heated sufficient to keep frost out, or say, to be definite, for the maintenance of a temperature of 45° to 60° all the winter through, they are safe. This house is ample in dimensions, is paved with clean Portland cement, is dry and light, and clean and warm in the season when a garden under glass is one of the most precious in all the round of tasteful luxuries.

In the conservatory *display* is of more importance than cultivation; hence many a conservatory not well adapted for the growth of plants, may be kept gay by the introduction to it of plants brought forward to a flowering state in the stove, greenhouse, or forcing pit. To direct in detail on such matters is impossible. But we must insist that the conservatory should be at all seasons a place of resort rather than of work, and if disorder and crowding may be tolerated in the greenhouse, here we must have the most perfect cleanliness, and the richest harmony possible. Happily we have at our command so many beautiful plants that need little more than mere protection, that, given a suitable house, and the rest is easy: so easy, that it is as much a matter for surprise as for regret, that there are to be met with conservatories suited to the highest purposes of such structures, which are nevertheless discreditable to their owners.

CHAPTER II.

THE GREENHOUSE.

From heaven descend the drops of dew,
From heaven the gracious showers,
Earth's winter aspect to renew,
And clothe the spring with flowers;
From heaven the beams of morning flow,
That melt the gloom of night:
From heaven the evening breezes blow
Health, fragrance, and delight.

MONTGOMERY.

IN the customary language of the garden, a "greenhouse" is a house for plants that are so far tender that they need protection during winter, but so far hardy that protection from frost is sufficient for their preservation. It is distinguished from the "stove" by its lower temperature, and by that alone, and as the stove might otherwise be designated by the almost obsolete term "hot-house," so the greenhouse might be called the "cool-house" or the "temperate house." The stove is intended for tropical and sub-tropical plants; the greenhouse for plants of temperate climes, but more particularly for such as are nearly but not quite hardy in this country. In the brief essay we shall now attempt, the stove, the intermediate house, and the greenhouse will be considered together, with a view to a few useful suggestions as to their arrangement and management, and their several uses.

It is a most important matter when the construction of a plant-house of any kind has been determined on, to take into account that possibly many

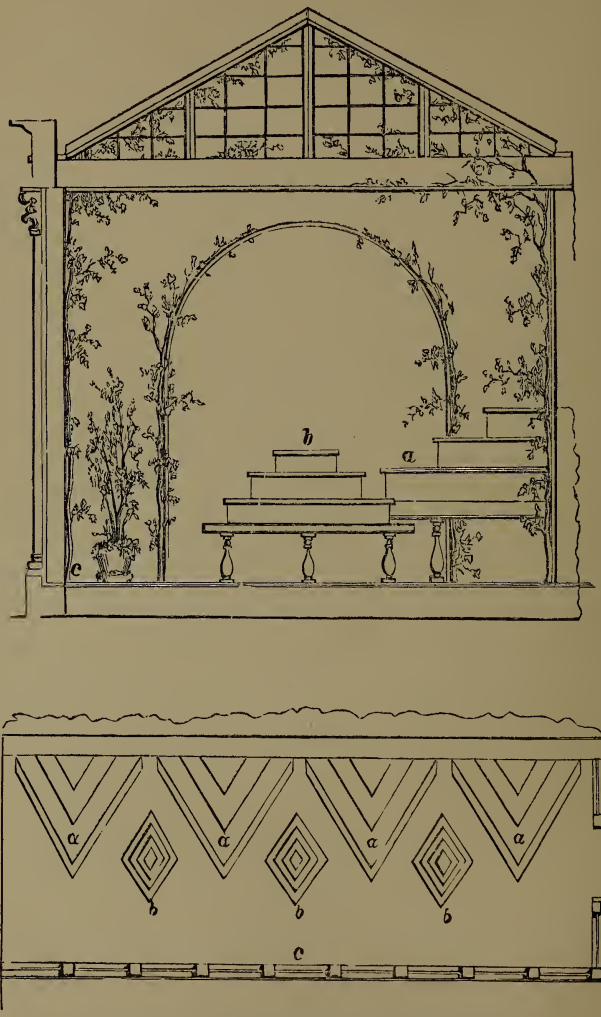
another plant-house may be built by and bye. It may be that the intention is to build one in such and such a spot, and then to rest and be thankful. But years pass on, the desires of the owner overpass the means of gratification, and another house is to be built. Alas! the site on which it should be placed is no longer available, and it is placed just where it should not be, because, forsooth, it cannot be placed where it should be. The amateur is no greater victim of a finality delusion than the plant merchant and nurseryman. In private gardens and nurseries alike, we commonly see the plant-houses far separated, of all forms and sizes, having no relation one to another, and costing for management, heating, and repairing, perhaps ten times more than if they were all compact together, arranged on a definite plan, and the whole heated by one boiler, with a supplementary boiler as a safeguard against loss in the case of any accident. Perhaps the reader is startled by this portentous preface, and ready to exclaim, "What! if I put up a little greenhouse, must I keep in view the probability that I shall some day cover an acre of land with glass?" The reply to the imagined exclamation is that we cannot at this moment fix the rule of our lives for all the moments that are coming. The suggestion with which we open this essay applies to great gardens and to little gardens alike, and we repeat that it is advisable in determining the site for a plant-house to keep in view the possibility that some day the house itself will be enlarged, or another house added to it. There may be good reasons in particular cases for scattering the plant-houses all over a property, but it is the duty of a practical essayist to say that they can be more easily and more cheaply managed, and will yield more enjoyment to their owner, generally speaking, when they are all closely connected and built according to a predetermined scheme. While we write the builders are at work putting up glass in our new garden. We have selected for the purpose a spot which will admit of extensions up to a certain point, so that greenhouses may be added, or those now building may be enlarged without any difficulty for, say, the next half century.

In the chapter on the conservatory enough has been said about facility of access at all seasons, and those remarks apply to plant-houses of all kinds. It is, however, neither possible nor desirable to have every plant-house so contiguous to the dwelling that we may go to it in slippers and bare-headed any day in the year as we go to the breakfast-room or library. But the amateur who purposes to grow a great variety of plants would do well to consider the convenience of having the several houses so connected that they

may all be traversed as one structure, glass doors and divisions alone separating them, with no intervening yards, or paths, or open spaces, to chill the visitor who has been stewed in the stove and might very well bear to be cooled in the greenhouse, if only it could be reached without the agony of three minutes' exposure to a biting north-east wind.

The horticultural builders offer us an endless choice of greenhouses, and many of the modes of construction are patented. As it is our fixed rule not to recommend traders in any department, we refrain from offering any opinion as to the relative merits of these various inventions. But a few remarks on first principles may be useful. Abundance of light and abundance of air must always be at the command of the cultivator. To shade out excess of light and to close all ventilators is easy work enough, but if the house is so constructed that neither light nor air can obtain access in sufficient plenty, healthy vegetation will never be seen within it. As to the forms and dimensions of houses, the uses to which they are to be put and the length of the proprietor's purse must determine. The best possible house for all general purposes is one with a span roof, the roof as low as possible to afford sufficient head-room and to accommodate the plants, with stages on each side and walk through the centre, and beneath the stages a sufficient service of hot-water pipes heated by a saddle or upright boiler. The lean-to form is admirably adapted for the utilization of a suitable wall; if the aspect is full south, a lean-to would answer admirably for vines, and almost all kinds of flowering plants: in a north aspect ferns would thrive, in east and west aspects camellias, oranges, and a number of valuable hard-wooded plants, such as heaths, epacrises, and hedaromas. A safe angle for a roof is 45°, but low nearly flat roofs answer admirably for flowering plants in the case of span-roofed houses in open sunny positions, as we obtain thereby the immense advantage of having all the plants "near the glass."

But we must consider effect as well as cultivation, and our plain tables and straight lines will not suit everybody. Here, then, is a scheme for the interior arrangements of a roomy and rather lofty house, which it will be seen has an ornamental façade, the lines of which are indicated on the left boundary of the figure, the frontage consisting of pilasters enclosing glass to the ground line, as in the figure of the lean-to which will be noticed presently. On either side climbing plants are trained up the pillars *c*, and over the roof. The rear wall has a stage, *a*, formed in a series of triangles with arched trellises intervening. In every opening of the rear stage is placed a staged table, *b*. There



INTERIOR ARRANGEMENT OF A PLANT-HOUSE.

is thus formed a sort of labyrinth-walk amongst a succession of groups of plants, and the effect is delightfully picturesque, provided only the stages are well furnished, and the plants are grouped with taste. This house might be the principal feature in a group, the house for enjoyment *par excellence*. From its agreeable temperature we might pass one way to the stove to see orchids, poinsettias, and euphorbias, in their gorgeous dressings of colour, and in another direction to the geranium-house, or the heath-house, or even to a snug little low-roofed structure, wholly unheated, and filled with herbaceous plants of the choicest kinds that need a little shelter for their preservation. There are hundreds of beautiful subjects worth growing in pots under glass that amateurs sadly neglect because they are not known as greenhouse but as "hardy" plants, and therefore do not obtain the shelter and the care they really need for their perfect development. In our own little "sanctum," which is indeed a continuation of the geranium-house, but divided off from it by a glass wall and door, and without any means of heating, we have a number of hardy plants with variegated leaves, hardy primulas, irises, cyclamens, androsaces, veratrums, sedums, sempervivums, aspidistras, and such like, that would scarcely thrive on our cold soil, and at all events would not be as they are, bright and beautiful all the winter, cheating the climate of its power to harm them, and antedating by their precocity of flowering the advent of the spring. Once build the house and determine that it shall be so devoted, and there will be found for it many more worthy subjects than probably there will be room to accommodate. Our sanctum serves an admirable purpose, too, in another way. It is the last house in a range running north and south, and as it occupies the north end it acts as a screen to the geranium-house, of which it forms a part, though divided off by glass, and the result is that it breaks the force of bleak winds, and renders a less consumption of fuel necessary for heating the geranium-house than if this last were not so protected.

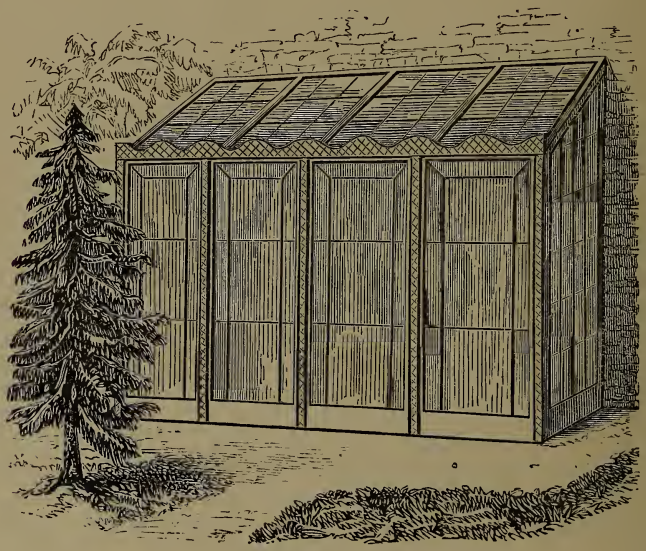
Lean-to houses are of immense value because of the warmth of the wall and the reflection from it of solar light and heat. But plants of perfect outline and large size can scarcely be grown in them, for as

> "The sunflower turns to her god when he sets
> The same look which she turned when he rose,"

so in a lean-to structure the vegetation will inevitably be more or less one-sided; it may be but slight and of no practical consequence, but the fact must not be ignored. In the annexed figure a neat but narrow house is shown, of a

kind suitable for protecting camellias, or orange or lime trees, trained to the wall; with myrtles, abelias, and other nearly hardy shrubs in pots next the glass in front. In fact in such a house as this we have grown without any aid of fire heat the lime and the shaddock to perfection, and a great lime producing its handsome, fragrant, and useful fruit will not soon weary its possessor, though its aspects vary but little with the changing seasons.

We have nothing to say here on the subject of bedding plants, except that we know nothing of them as proper greenhouse plants. It is indeed the



custom to crowd the greenhouse with geraniums, verbenas, and other plants that are employed in the flower garden during summer; but it is a degradation of a greenhouse thus to use it as a mere store or shop when it might be much better employed. It is not for us to dictate, but to suggest and advise, and we do mildly suggest that bedding plants are more at home in pits and frames than in houses to which we should resort for amusement, and where from early autumn until late in spring there should be found abundant entertainment for the senses and the mind. Our stores are really exhaustless, and

therefore it cannot be from poverty of choice that bedding plants are thrust into every plant-house, to the exclusion of ericas, camellias, cinerarias, fuchsias, grevilleas, justicias, azaleas, kalosanthes, amaryllis, and a hundred more fine subjects that pay liberally for the glass that covers them and the heat that keeps them in health and vigour. But it is easier to write prescriptions than to carry them out, and many are compelled to keep their stock of bedding plants in the greenhouse and make the best of it. However, we have relieved our mind on the subject, and pass on.

The proper association of plants in houses is a matter of the utmost importance. A hot wall and long rafters may answer admirably for vines, but we shall not succeed in growing any great variety of flowering plants beneath them; yet it may happen that a few ferns, begonias, and even camellias, will thrive there if not too heavily shaded, especially as we can remove the camellias into the open air towards the end of the summer to finish their growth, and all winter and far into spring the vines will make no shade at all, or too little to be of any consequence. So again, hard-wood and herbaceous plants do not generally thrive under the same roof with the same treatment, for the hard-wooded plants need abundance of light and air, and such herbaceous subjects as cinerarias and begonias need far less of both; yet much may be done by means of skill and care if the selection is judiciously made. Succulent plants are but little grown by amateurs, yet they have high claims to their attention, and will abundantly repay the genuine lover of plants who will take them in hand in earnest. Abundance of light is one of the first essentials of success in the management of these, and they must be dry in winter. But of all the plants that are grown for ornament, those that flower in winter are without doubt the most deserving of our care, for the simple reason that nature is niggardly in this clime, and through half the year she denies us out-door flowers, at all events in plenty. What a wealth of beauty is at our command for the enrichment of our plant-houses in winter, and what a very small use we make of it! None will deny, though few enjoy, the preciousness of winter flowers. The earth is barren where they should abound, for nature's grim denial may be put to scorn by art, and we may walk through bowers of bloom when

"Dread winter spreads his latest glooms,
And reigns tremendous o'er the conquered year."

A SELECTION OF CONSERVATORY PLANTS CHIEFLY CHARACTERIZED BY NOBLENESS OF PORT OR ELEGANCE OF LEAFAGE.

Agave americana, A. americana fol. var., A. applanata, A. cœrulescens, A. filifera, A. Schidigera, A. dasylirioides, A. Verschaffelti.
Aloe plicatilis, A. serrulata.
Aralia leptophylla, A. palmata, A. papyrifera, A. quinquefolia, A. reticulata.
Araucaria Bidwilli, A. Cooki, A. Cunninghami, A. excelsa.
Arundo donax variegata.
Aspidistra lurida variegata.
Bambusa Fortunei variegata.
Beaucarnea recurvata.
Dammara Browni, D. Moorei.
Dracæna australis, D. fragrantissima, D. indivisa, D. nutans, D. Veitchi.
Echeveria metallica.
Ficus elasticus, F. Chauvieri, F. Porteana.
Grevillea Drummondi, G. elegans, G. robusta.
Hydrangea japonica variegata.
Lomatia elegantissima, L. ferruginea.
Osmanthus ilicifolius aureus variegatus.
Phormium tenax, P. tenax variegatum.
Rhopala australis, R. corcovadensis, R. Porteana.
Saxifraga Fortunei, S. sarmentosa.
Sedum carneum variegatum, S. Sieboldi variegatum.
Veronica Andersoni variegata.
Yucca aloifolia variegata, Y. filamentosa variegata, Y. quadricolor.

Palms.—Areca Baueri, A. lutescens, A. sapida, Brahea calcarea, Chamærops excelsa, C. Fortunei, C. humilis, C. palmetto, C. sinensis, Cocos australis, C. Bonnetti, C. chiliensis, Corypha australis, Latania borbonica, Phœnix dactylifera, P. humilis, P. sylvestris, Raphis flabelliformis, R. flabelliformis fol. var., Sabal Adansoni, S. Moccini, Seaforthia elegans, Thrinax parviflora, T. tunicata, Trithrinax mauritiæformis.

THE FERN HOUSE.

That which may profit and amuse is gathered from the volume of creation,
For every chapter therein teemeth with the playfulness of wisdom.
The elements of all things are the same, though nature hath mixed them with a difference,
And learning delighteth to discover the affinity of seeming opposites:
So out of great things and small draweth he the secrets of the universe,
And argueth the cycles of the stars, from a pebble flung by a child.

TUPPER.

ONE of the best possible of "rustic adornments" is a well-furnished fernery, both because of its constant attractiveness and the comparatively small amount of labour and skill required to keep it in perfection. To institute comparisons amongst the various features of a garden is by no means, in order to assess their relative values, desirable. To one ardent amateur an orchid-house may afford the best amusement in the world; to another neither ferns, nor orchids, nor greenhouse plants, nor florists' flowers may offer the slightest permanent interest; but this one may be happy in the orchard-house, and may consider the cultivation of fruit-trees in pots glorious pastime. *Chacun à son goût.* There cannot be a doubt, however, that for recreative purposes, and more or less of botanical study, a fern house will suit the tastes

and conveniences of a greater number of persons, especially in towns, than any other of the many elegant appendages of the household that might be fairly put in competition with it for favour and acceptance. The probabilities are all in favour of the fern house proving to be the most beautiful feature, even in a large and well-kept garden, but it is ten times more to be desired in the small garden, or where there is no garden at all; for as a mere "annexe" to the dwelling it may be made a delightful place of resort, to refresh the eye with its cheerful verdure and variety of graceful forms, and so make a blessed change from the depressing monotony of daily life in the heart of a great city. Granted that it ranks first in importance as to its suitability to gratify a diversity of tastes, while making but small demands on the purse or skill of the possessor, there is yet one word more to be said in its favour of the utmost importance. A position may be selected for the fern house which would be quite unfit for a greenhouse intended for flowering plants. A sunless spot will suit for ferns, and, indeed, if there is but a mere glimmer of daylight, provided other conditions are suitable, it is still possible to create a fern garden under glass; for we can easily find a number of the loveliest of ferns that will actually thrive in twilight. We will not, however, consider extreme cases; it is sufficient that an aspect full south, with many hours' exposure to the summer sun, is *not* suited for a fern house, but any other aspect will suit; and the best of all is one due north, but fully exposed to the daylight, that is to say, not over-shadowed by trees or very closely hemmed in by high walls. Reserve the sunny spots for plants that need the sun, the ferns will thrive without sun; at the same time, an hour or two of sunshine every day throughout the year is good for a fern house, and that is the reason we say that any aspect not exposed to the full glare of the summer sun for many hours together will answer for the purpose.

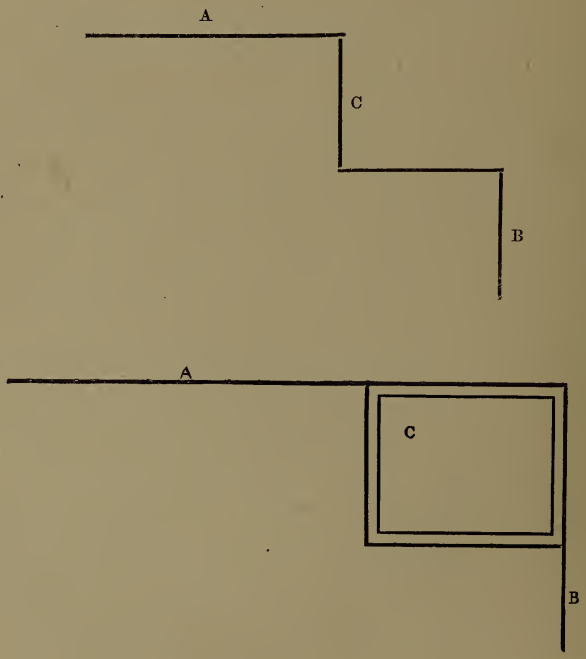
Although the terms are commutable, we make a distinction between a fern house and a house for ferns. We are thinking of a cool house, spacious enough for the formation within it of a rockery, in which the ferns are to be planted out, and where there will be room to move about freely for enjoyment as well as for work. A house for ferns may be a different affair altogether, filled with pot plants, maintained at a tropical temperature, affording scarcely room enough for a man of ordinary size to turn about in it, and perhaps everywhere damp and dirty, as happens to be the case with many a house in which valuable collections are kept in a wonderful state of health and vigour.

It need not be explained that equal success may attend the effort to

construct a fern house though very different plans are adopted. We may find a high dark wall on which, perhaps, ivy would scarcely grow, and by constructing a lean-to house in front of it accomplish all that could be desired. Thousands of so-called "conservatories" and "greenhouses" annexed to town dwellings in sunless aspects would make pretty little ferneries, but when occupied with flowers make no other return but vexation for the wasteful outlay incurred in keeping them furnished. If we had to build a house for the purpose, expense no object, no restriction as to space, the well-doing of the ferns and the comfort of visitors alone to be considered, we should proceed as follows:— Four strong walls of brick or stone, six to eight feet high at least; on these walls a low span-roof, the glass to be Hartley's rough plate; ventilators at intervals along the ridge-line and in the walls; the ground to be laid out in walks and rockeries; all the walls to be built over with rock and planted, and, if to the taste of the designer, a few arches thrown across, both to break the hard sky-line of the roof and afford aërial sites for ferns. A cave might be added, either above or below ground, to suit the filmy ferns and their allies; a pond for gold fish would be appropriate; a bountiful supply of water would be necessary; a service of hot-water pipes sufficient to exclude the severest frost would be desirable. From first to last, however, it must be remembered that artificial heat is not absolutely necessary, and, therefore, no one need be deterred from establishing a fern house by the consideration of the expense of heating it, and the subsequent labour that advantage would involve. A lean-to house on the wall of a dwelling would have more power of resisting frost than a span-roofed house standing apart from other structures, and, as we rarely have frosts of long duration, the possessor would not often be shut out from the miniature Arcady by reason of the cold.

A few examples may be useful. First, for a small one, but a good one of its sort. The fern house at Stoke Newington is a lean-to, occupying a position on the west side of the dwelling, where, owing to contiguous buildings and large trees, sunshine is so far excluded that flowering plants would not quite prosper in it. Suppose A to be the west wall of the dwelling-house; B, the north wall; C, an ugly corner that for a time we may be puzzled what to do with. We alter the state of things by constructing a fern house there, to fill up the gap, and gain for our advantage two warm walls, against which to pile up a rockery, and in this rockery the ferns and lycopodiums are planted. A neat paving of tiles affords a comfortable footing; the rockeries rise to the roof, and consist of banks of peat, faced with burrs from the brick-kiln,

planted with ferns everywhere except on the top next the glass, where a few sedums, sempervivums, and other succulent plants enjoy the extra light and less moisture incident to their position. There never was a better work in the way of gardening accomplished here than the building of that little fern house, in which about a hundred and fifty species and varieties have thriven during twelve years past, making summer all the year round in their perennial greenness.



Another example worth special mention is that in the garden of Alfred Smee, Esq., at Carshalton. This is partly excavated, so as to be below the ground-level. Instead of brick walls, broad solid banks of peat are provided for the support of the roof, which is a low span: one side, that to the north, being of glass, the other side covered with felt. At the lowest end is placed the furnace, and a sufficient service of hot-water pipes to maintain there a tropical

MRS. HIBBERD'S FERN HOUSE AT STOKE NEWINGTON.

temperature. In the centre of the house the hot-water pipes are reduced in number, and the result is a greenhouse temperature. At the upper end there is only one four-inch pipe, just to keep out frost; and here we have only a little better climate than prevails outside, but with the advantage of glass to shelter the ferns and the visitors. Thus in one house the ferns of all climates may be represented, and we pass by pleasant degrees from the cool department to the tropical, and may take time to recover from the bath of warm vapour we are treated to in the lower part of the house ere emerging again into the open air. It will be understood, of course, that in a district where peat is plentiful, such a house is a comparatively inexpensive luxury; and we can assure the reader it is so furnished and kept that we might wander far and wide to find its equal in interest and beauty.

An example open to public inspection is more useful, however, for our purpose; and for that reason, as well as for its intrinsic merit, we present a sketch of the cool fern house at the nursery of Messrs. Veitch and Sons, King's Road, Chelsea. It will be seen that this has a low span-roof, and walls that are made to serve as supports for rockeries. The ground-plan shows how the rockeries are brought out from the walls so as to form, with the centre block, an irregular design. These rockeries vary in every possible way in outlines, to afford in some cases table-like spaces for ferns of large growth, and in others a succession of moist ledges and nest-like hollows for the smaller kinds, with occasionally a steep slope which is carpeted with delicate ferns and mosses. It is approached by three entrances, A, A, A. The great centre block B, is its principal feature, as hereon are displayed the grandest of the ferns, the noble *Woodwardia radicans*, which crowns the summit, needing ample space for the full development of its splendid fronds.

In the formation of a greenhouse fernery it is not enough to gratify a particular taste, which, by the way, may happen to be a bad taste; it is essential to provide for the plants, so that there shall be no struggle with difficulties afterwards to keep them alive. If the work is well done, the ferns will grow and fill their owner with delight, and nothing short of the most luxuriant growth possible should satisfy the cultivator. Enough has been said perhaps on the form and construction of the house, and the next point for consideration is the rockery. Now, it is necessary to guard against a fatal error in this matter. We occasionally obtain a peep into ferneries that are founded on a delusion. We see fantastic pyramids and arches studded with myriads of sharp projections in the fashion of stalactites, the colouring of the

whole a repulsive tone of bright yellowish grey, the material being furnace clinkers artistically coloured, with not a crumb of soil for the ferns to root in except what can be thrust into wretched little "pockets" of the capacity of a tea-cup each. There may be in the house a few good ferns in pots on the floor or surrounding a fountain in the centre, and a few more very bad ones in pots thrust into unhappy chinks in the fanciful rockery; but the affair at best is only a costly extension of the idea on which a peep-show at a country fair is founded. The sham stalactites are the attraction, if there be any attraction, and the deluded folks who declare it "beautiful," declare also by that utterance that they have not the least idea of what a fernery should be, or what ferns require. A fernery is for ferns, and must be so ordered that ferns will thrive in it. One good tuft of maiden-hair or marine asplenium, beaded with moisture and glistening with health, is to be preferred to all the painted clinkers and childish frippery that was ever seen in a house of this kind, no matter what it may have cost, or how much weariness and solicitude may have been entailed upon the owner to secure its construction. We must have first of all a mass of soil, that the ferns may have abundant root-room, not simply to *live*, but to *grow* and *increase*. For the rockery there is nothing better than brick or stone, because of the retention of moisture by these materials and the liking of ferns to root next to their surfaces, and even into their substance. Circumstances may prohibit the selection of the material known to be the best, and we must then be content with the next best. Hard vitreous substances, impenetrable by moisture, are unfit for rockeries for ferns under glass, yet they may be used if nothing better can be obtained, provided always there is a large body of soil and abundant openings amongst the facings for the searching roots of ferns to push their way for nourishment. In towns, the most convenient and suitable stuff for rockeries is the waste of the brick-kiln. The large masses of brick that come from the base of the kiln, and which are commonly known as "burrs," are as good for the purpose as can be desired; their crannies and crevices suit the rooting habits of the plants, and they are suitable also in colour, and after a time a slow decay of their surface takes place, the result being that troops of mosses come of their own accord, and dot the structure with patches of emerald. Stone is better still, if in rough blocks, and sandstone especially, if it can be had, will favour the well-doing of every inmate of the house. We have seen roots piled up and planted, and they answered well; but they decay too fast, and are apt to become suddenly clothed with a myriad kinds of objectionable fungi, which

INTERIOR OF FERN HOUSE, MESSRS. VEITCH AND SONS' NURSERY, CHELSEA.

GROUND-PLAN OF FERN HOUSE AT MESSRS. VEITCH AND SONS' NURSERY.

are difficult to eradicate. The best staple soil for the purpose is good peat; but as in many districts this is a costly material, it is necessary to eke it out. Our rockery was built by a bricklayer who thoroughly understood the requirements of the case. We made a bed of loam for the foundation, and upon this the peat was piled or thrust in as the work proceeded, and when the bricklayer had finished his work, we found plenty of large and small pockets opening into the solid bank behind; in these the plants were placed and filled in with a good mixture of peat and sharp sand.

Drainage is of more importance with reference to the comfort of the cultivator than the well-doing of the ferns. It must be understood, however, that the accumulation of stagnant water at the base of the rockery is an evil to be guarded against, to say nothing of a possibly sloppy state of the paths or pavement, if the house is unprovided with drainage. Let it suffice that this point has been mentioned, for in practice it is of less consequence than in theory. If the fern house stands on a tolerably dry soil, and the cultivator acts judiciously in the management of it, there will never be such an accumulation of water as will be objectionable or inconvenient.

In the selection of ferns, the matter for first consideration is their relative hardiness. If the house is heated, there is a wider range for selection than otherwise, but in a house wholly unaided by artificial heat an immense number of the most beautiful kinds may be grown to perfection. If the question were pressed for a decisive answer, whether, speaking in a general way, a fern house should or should not be heated, we should pronounce it highly desirable to heat it to ordinary greenhouse temperature, both because in that case it might suit, *cæteris paribus*, for full nine-tenths of all the ferns known, and because also it would be enjoyed in all weathers, and would be almost as bright on New Year's Day as at midsummer. Charcoal stoves and hot-water bottles and candles are available to repel frost where there is no proper heating apparatus; but these are troublesome and very apt to fail at the moment when they are most wanted. Therefore our advice to all is, be content with the proper range of your opportunities; plant such ferns as the house will accommodate without necessitating a strain upon your attention at any time, for when a hobby swells out like a nightmare into a gigantic vexation or anxiety, it ceases to amuse, and increases instead of relieving the cares of life.

At this point the whole subject of fern-culture opens before us, and it is therefore time to stop. It must suffice to say here that sufficient room should be allowed in planting for the plants to extend themselves and attain perfect

development; that they should be planted firm and filled in with a good mixture of peat and sand, and in many cases it will be necessary to *build* them in, to secure to plants of peculiarly noble aspects commanding positions. The after-attention consists chiefly in watering, which must be attended to with regularity, copious supplies being given in summer, but very little in winter, and during frost none at all, unless the house is heated, in which case the supplies must be continued in moderation. Ventilation will be necessary, but ferns need less air than most other plants, and especial care must be taken to avoid exposing them to cold draughts in spring, and to the exhaustive sultry breezes of high summer. At such times keep the house close, and promote humidity by sprinkling the floor with water.

He is the happy man, whose life e'en now
Shows somewhat of that happier life to come;
Who, doomed to an obscure but tranquil state,
Is pleased with it, and, were he free to choose,
Would make his fate his choice; whom peace, the fruit
Of virtue, and whom virtue, fruit of faith,
Prepare for happiness; bespeak him one
Content indeed to sojourn while he must
Below the skies, but having there his home.

COWPER.

A SELECTION OF FERNS FOR A COOL GREENHOUSE.

Adiantum affine, A. cuneatum, A. pedatum.

Asplenium adiantum nigrum, A. angustifolium, A. bulbiferum, A. fabianum, A. marinum, A. fontanum, A. rhizophorum, A. trichomanes, A. viride.

Athyrium filix-fœmina, A. f.-f. corymbiferum, A. f.-f. crispum, A. f.-f. Fieldiæ, A. f.-f. Frizelliæ, A. f.-f. grandiceps, A. f.-f. latifolium, A. f.-f. mucronatum, A. f.-f. plumosum, A. f.-f. Vernoniæ, A. f.-f. Victoriæ.

Blechnum spicant ramosum.

Ceterach aurea, C. officinale.

Cyrtomium falcatum.

Davallia bullata, D. canariensis, D. tenuifolia.

Doodia aspera, D. caudata, D. lunulata.

Gymnogramma leptophylla.

Lastrea æmula, L. cristata, L. dilatata, L. Goldieana, L. filix-mas Bollandiæ,

L. f.-m. cristata, L. furcans, L. marginalis, L. nova boracensis, L. opaca, L. Sieboldi, L. Standishi, L. thelypteris.

Lomaria alpina, L. chilensis, L. magellanica.

Onoclea sensibilis.

Osmunda cinnamomea, O. Claytoniana, O. gracilis, O. regalis.

Polypodium alpestre, P. dryopteris, P. phegopteris, P. Robertianum, P. vulgare, P. v. cambricum, P. v. semilacerum, P. v. serratum.

Polystichum acrostochioides, P. aculeatum lobatum, P. angulare cristatum, P. a. grandiceps, P. a. plumosum, P. a. proliferum, P. proliferum Haleanum, P. pungens, P. setosum.

Platycerium alcicorne.

Pteris cretica, P. hastata, P. scaberula, P. serrulata, P. s. cristata, P. s. polydactylon, P. tremula.

Scolopendrium vulgare, S. v. crispum, S. v. cristatum, S. v. laceratum (endiviæfolium,) S. v. marginatum, S. v. ramosum, S. v. Morgani, S. v. multifidum, S. v. sub-marginatum, S. v. Wardi.

Struthiopteris germanicum.

Woodwardia orientalis, W. radicans.

SELECT FERNS FOR A WARM GREENHOUSE.

(All the species enumerated in the preceding list will also thrive in an intermediate house.)

Adiantum æthiopicum, A. assimile, A. concinnum, A. formosum, A. hispidulum, A. reniforme, A. scutum, A. setulosum.

Alsophila australis, A. excelsa.

Asplenium consimile, A. formosum, A. palmatum, A. pulchellum, A. Veitchianum.

Balantium culcita.

Blechnum brasiliensis, B. corcovadense.

Cibotium Barometz.

Cyathea dealbata.

Davallia dissecta, D. tenuifolia stricta.

Dicksonia antarctica, D. squarrosa.

Drynaria musæfolia.

Gleichenia dichotoma, G. heicistophylla, G. rupestris.

Goniophlebium appendiculatum, G. subauriculatum.
Gymnogramma Massoni.
Litobrochia aurita, L. vespertilionis.
Lomaria ciliata, L. gibba, L. g. major, L. g. Belli, L. zamiæfolia.
Lygodium palmatum, L. scandens.
Microlepia hirsuta angusta.
Thamnopteris australasica, T. nidus.
Nephrodium molle, N. corymbiferum.
Nephrolepis exaltata, N. pectinata, N. tuberosa, N. davallioides.
Nothochlæna lævis, N. rufa.
Phlebodium aureum, P. sporodocarpum.
Platyloma cordifolia.
Polypodium effusum.
Pteris argyrea, P. cretica albo-lineata, P. tricolor.

A SELECTION OF THE MOST USEFUL FLOWERING PLANTS FOR THE GREENHOUSE.

Spring.—Acacia armata, A. dealbata, A. Drummondi, A. grandis, A. pubescens, Blandfordia Cunninghami, B. nobilis grandiflora, Boronia Drummondi, Camellia alba plena, C. Beali, C. Chandleri elegans, C. Comtesse Lavinia Maggi, C. Countess of Ellesmere, C. Marchioness of Exeter, C. Mathotiana, C. Rubens, C. Teutonia, Chorozema cordata splendens, C. Lawrenciana, Coleonema rubra, Correa Harrisi, Cyclamen persicum, Cytisus racemosus superbum, Epacris Exquisite, E. impressa atrococcinea, E. Kinghorni, E. miniata splendens, E. Viscountess Hill, Erica Wilmoreana, Imatophyllum miniatum, Polygala oppositifolia, P. cordata, Tetratheca hirsuta.

Summer.—Acrophyllum venosum, Adenandra fragrans, Aphelexis macrantha purpurea, Azalea Beauty of Dorking, A. Chelsoni, A. Duc de Nassau, A. Extranei, A. Flower of the Day, A. La Superbe, A. Lizzie, A. Duchesse, A. de Nassau, A. Inveryana Improved, A. Madame Miellez, A. Marie Vervaene, A. Perryana, A. Grand Crimson, A. President Clayes, A. President Humann, A. Reine des Roses, A. Sir C. Napier, A. Stella, A. The Bride, A. Vesuvius, A. Virginalis, Chorozema varia Chandleri, Dracophyllum gracile, Epacris Eclipse, Erica Aitoniana, E. Candolleana, E. Cavendishi, E. depressa, E. elegans, E. jasminiflora alba, E.

Massoni major, E. obbata, E. tricolor elegans, E. tricolor superba, E. ventricosa alba, E. ventricosa coccinea, E. ventricosa rosea, E. vestita coccinea, Genetyllis fuchsioides, G. tulipifera, Kalosanthes coccinea superba, K. Madame C. Winans, K. Phœnix, Leschenaultia formosa, Pimelea Hendersoni, P. decussata, P. spectabilis, Pleroma elegans, P. sarmentosa, Roella ciliata, Rhynchospermum jasminoides, Statice Holfordi, S. profusa.

Autumn.—Agapanthus umbellatus, A. umbellatus alba, Browallia Jamesoni superba, Brugmansia sauveolens, Diplacus glutinosus, Erica Austini, E. Macnabiana, E. mammosa major, E. Marnockiana, Hæmanthus coccineus, H. puniceus, Hedychium Gardnerium, Lantana Madame R. Chauviere, L. Jean Bart, L. Raphael, L. Ne Plus Ultra, L. Victoire, Lilium auratum, L. lancifolium rubrum, L. lancifolium album, Nerine Fothergilli, N. coruscans, Nerium album plenum, N. roseum plenum, Plumbago capensis, Schizostylis coccinea, Tremandra verticillata, Vallota purpurea, Veronica Andersoni, V. Belle de Lyon, V. Blue Gem, V. Imperialis, V. Princesse Mathilde, V. salicifolia.

Winter.—Acacia platyptera, Coronilla glauca, C. variegata, Correa Brilliant, C. cardinale, C. magnifica, Crowea saligna latifolia, Cyclamen Atkinsi, C. persicum, Cytisus Atleeana, C. Everestiana, C. racemosus, Daphne indica alba and rubra, Epacris autumnalis, E. delicata, E. hyacinthiflora, E. hyacinthiflora candidissima, E. hyacinthiflora fulgens, E. Lady Alice Peel, E. Mrs. Pim, E. Lord Palmerston, Erica colorans, E. gracilis autumnalis, E. hyemalis, E. regerminans, Habrothamnus fasciculatus, Imatophyllum cyrtanthiflorum, Jasminum grandiflorum.

A SELECTION OF THE MOST USEFUL FLOWERING PLANTS FOR THE STOVE.

Spring.—Æschynanthus splendidus, Amaryllis aulica, A. Regina, A. marginata conspicua, Anthurium Scherzerianum, Begonia albo coccinea, B. Digswelliana, B. fuchsioides, B. longipila, B. weltoniensis, Clerodendron Thompsoni, Dalechampia Roezliana rosea, Eucharis grandiflora, Franciscea eximia, F. Hopeana, Gardenia citriodora, G. florida major, G. Fortuneana, Hippeastrum pardinum, Inga pulcherrima, Meyenia erecta, Monochætum Lemonianum, Nidularium fulgens, Plumbago coccinea superba, Rondeletia speciosa major, Thyrsacanthus rutilans, Veltheimia viridifolia.

Summer.—Achimenes in var., Allamanda Hendersoni, A. nobilis, Clerodendron Balfouri, C. fallax, Dipladenia amabilis, D. amœna, D. crassinoda, Gloxinias in var., Franciscea confertiflora, F. calycina major, Hoya bella, Ixora acuminata,

I. coccinea superba, I. crocata rutilans, I. javanica floribunda, I. salicifolia, Medinilla magnifica, Rondeletia speciosa major, Urceolina aurea, Vinca alba, V. rosea, Stephenotis floribunda.

Autumn.—Æchmea fulgens, Amaryllis reticulata, Clerodendron Kæmpferi, Gloriosa superba, G. Planti, Impatiens Jerdoniæ, Lasiandra macrantha, Nidularium fulgens, N. pictum, Pentas carnea, P. rosea, Strelitzia reginæ, Torenia asiatica.

Winter.—Aphelandra aurantiaca, Begonia manicata, B. parviflora, B. Saundersiana, Centradenia rosea, Cyrtanthera grandiflora, Epiphyllum truncatum, E. truncatum aurantiactum, E. truncatum albo-violaceum, E. truncatum Salmonium, Eucharis amazonica, Euphorbia jacquiniflora, Gesnera cinnabarina, G. exoniensis, G. refulgens, G. zebrina splendens, Goldfussia isophylla, Heterocentrum roseum, Justicia speciosa, Luculia gratissima, Monochætum ensiferum, M. sericeum multiflora, Poinsettia pulcherrima, Rogeria cordata, R. gratissima.

A SELECTION OF BEAUTIFUL PLANTS SUITABLE TO GROW IN AN UNHEATED GREENHOUSE.

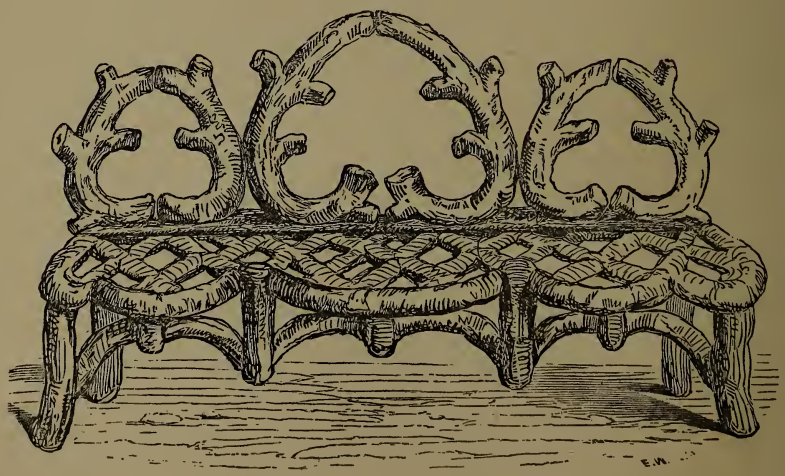
Achillea millefolium rosea, fol. var.; Acorus gramineus, fol. var.; Arum Italicum; Aspidistra lurida, fol. var.; Aubrietia purpurea, fol. var.; Bambusa Fortunei, fol. var.; Carex pendula, fol. var.; Centaurea argentea; Chamœrops humilis; Cineraria platanifolia; Convallaria majalis, fol. striatis; Cyclamen coum album; Cyclamen marmoratum; Cypripedium calceolus; Cypripedium spectabile; Dactylis glomerata elegantissima; Dianthus hybridus striatiflorus; Dielytra spectabilis; Dielytra spectabilis alba; Dodecatheon meadia; Echeveria glauca; Echeveria metallica; Erythronium dens canis roseum; Eucomis punctata; Funkia Japonica lutea, fol. var.; Funkia ovata, fol. var.; Funkia undulata, fol. var.; Goodyera pubescens; Hoteia (Spirœa) Japonica; Iris reticulata; Ligularia Kempferi; Lilium candidum luteis variegatis; Orchis mascula; Ornithogalum thrysoideum; Phœnix dactyliferum; Phormium tenax; Polemonium cœruleum, fol. var.; Polygonatum multiflorum, fol. var.; Polygonum filiforme, fol. var.; Primula concolor; Primula cortusoides amœna; Primula denticulata; Primula farinosa; Rhodea Japonica, fol. var.; Richardia æthiopica; Saxifraga incrustata; Saxifraga pyramidalis; Saxifraga sarmentosa; Sedum Japonicum, fol. var.; Sedum Sieboldi, fol. var.; Sedum spectabile; Symphitum officinale, fol. var.; Vallota purpurea; Veratrum album; Veratrum nigrum; Viola odorata,

"The Czar;" Viola arborea; Vitis hederacea; Yucca filamentosa, fol. var.; Yucca recurva.

A SELECTION OF STOVE AND GREENHOUSE CLIMBERS.

GREENHOUSE.—Bignonia argyrea violescens, B. venusta, Brachysema latifolia, Clematis Fortunei, C. John Gould Veitch, C. lanuginosa, Cobæa scandens, C. scandens variegata, Gompholobium splendens, Habrothamnus elegans, Hibbertia volubilis, Hoya carnosa variegata, Kennedya coccinea major, K. inophylla floribunda, K. monophylla, K. racemosa, K. rubricunda superba, Lapageria alba, L. rosea, Passiflora cærulea racemosa, P. cincinnata, P. Loudoniana, P. Marryattæ, Solanum jasminiflorum, Tacsonia Buchanani, T. ignea, T. mollissima, T. Van Volxemi, Tecoma jasminoides alba magna.

STOVE.—Adelaster albivensis, Dipladenia splendens, Echites Harrisi, Hoya imperialis, Manettia bicolor, Passiflora Decaisneana, P. kermesina, P. princeps, Stephanotis floribunda, Thunbergia Harrisi.



THE APIARY

In belted gold, the bees with "merry march,"
Through flowery towns go sounding on their way,
They pass the streaked woodbine's sun-stain'd arch,
And onward glide through streets of sheeted May,
Nor till they reach the summer-roses stay,
Where maiden-buds are wrapt in dewy dreams,
Drowsy through breathing back the new-mown hay,
That rolls its fragrance o'er the fringed streams,—
Mirrors in which the sun now decks his quivering beams.

MILLER'S "SUMMER MORNING."

CHAPTER I.

A PERSUASIVE VIEW OF BEE-KEEPING.

MANY of our readers perhaps will be surprised to find bee-keeping entered in our catalogue of recreations for town-folk. They may imagine at first sight that we intend the bee-house as a useless ornament, devised to deceive the visitor, after the fashion of the Empress Catharine's painted villages, or the shrines and altars

which Watelet set up in his utilitarian grounds, wherein theatrical sacrifices and pagan rites were enacted in the finest style of child's play; or like any set of modern ruins, woods of canvass, or fairy palaces, temples, and fountains of painted timber. Such things are simply obnoxious; they are like those deceptive Arabian fruits which attract the eye, but fill the mouth with ashes. Our suburban apiary is a reality not to be thrust upon the unwary as a plausible experiment, but a *fait accompli;* and so favourably, that we look forward with hope to the day when the townsman shall regard the bee as his intimate neighbour and bosom friend, his moral preceptor, his purveyor of sweets, his companion, adviser, and by his yearly gift of virgin honey, a sanitary guardian of his household.

But supposing it to be possible to keep bees in healthy suburban districts, or even in the closer parts of towns, what inducements are there to enter upon a pursuit which, time out of mind, has been the hobby of villgae schoolmasters, farmers' wives, overworked curates, and naturalists addicted to the narration of what a great portion of the world regard as fictions, and not moderate fictions either, but wrought to the fullest with extravagances which beat the "Arabian Nights" out of all hope of competition. Why should the townsman turn apiarian? He can afford to buy honey if he wants it—though but few British citizens have ever tasted the pure commodity; he can read about bees much more than he cares to know; he has grown familiar with the shape of a hive from the gilt signs hung out at taverns and linen-drapers, and over the gateways of suburban tea-gardens; and he classes the bee with vipers, scorpions, hornets, and toads; creatures that sting, bite, or spit fire—the evil genii of creation—to be avoided by all except country bumpkins who can't be hurt, and mad naturalists who have lost all regard for the smoothness of their hands or the safety of their persons.

There are many, of course, on whom our warmest persuasions will fall as dead as drone music. We may urge and urge, but they will refuse to be led into bee-keeping, because of a fear of the bees themselves, or strong doubts as to its possibility. We leave such to the pursuits they have chosen, and wish them as much happiness as can be obtained without the help of home-grown "trickling honey-combs," who have no desire to see their own

> "Bees
> Hum about globes of clover and sweet peas."

There are two classes of persons on whom we may hope to make an impression.

The first are those whose minds are stored with the rich honey of classic lore, who dream about Aristæus and Aristomachus, who can quote the great old Stagyrite, Columella, Celsus, and Pliny, who know the fourth Georgic by heart in the original, and love the happy old Corycian as a grey-beard father. To these the buzzing of a swarm will recall the green youth of the world, when Hymettus flushed with wild thyme, and Hybla's flowery slopes were odoriferous gardens of sweets.

"Ille terrarum mihi præter omnes
Angulus ridet; ubi non Hymetto
Mella decedunt."

Horace.

For that happy unchanged roamer, the bee, the "free-born wanderer of the mountain air," blows his bugle to the same tune over our "fallow leas," as on the sixth day of creation, when he made his first sally among the new-born wood-cups, or rifled the sweets from Eve's Eden garlands, which she

"Bred up with tender hand,"

not feloniously seizing on the hidden treasure, but helping the flowers to perfect their fruits for the benefit of future generations, and freely sharing with man a store of golden honey-combs when the curse was passed, and the barren ground was watered with the sweat of human toil.

The scholar will adorn his home with hives of "singing bees," that he may hear the hum of Pan's great festival, and study the mysterious workings of an instinct that perplexed antiquity, and has furnished modern science with the most startling evidences of the minute workings of that great Designing Will, which maintains the balance of a million worlds, and equips a creature scarce bigger than a rain-drop with implements, armour, and a system of mathematics that strike the philosopher dumb with wonder and admiration.

There is another class to whom we may make a more homely appeal, asking them to remember—as perhaps they do, but not too fondly—the scenes of early youth, the rustic home, the flower-garden with its row of dark brown hives, tended by hands, doted on by hearts that now

"Rest beneath the clover sod."

Hearts that doted upon them too, hands that pushed back from the forehead the truant curls, and in the hour of childish suffering moistened the fevered lips with the cool nectar of those well-remembered hives. Our towns are

crowded with children of the manor-house, the farm, the cottage, and the way-side smithy; feet that hurriedly pace the dry pavement still retain the elastic step with which they brushed the cool dew from heather bells, or threaded the maze of mossy woodland, under the pattering of beech-nuts or the flutter of cooing doves.

Who, then, can wonder that our smoky towns are belted round with flowery gardens and ornamental slopes and shrubberies? Who can wonder that amid the deadening influences of city life the natural instinct of man rises superior to circumstances, and that he will have beauty with him wheresoever he may be; that he will conquer difficulties, and though he himself fall before the city plague, his favourite flowers shall escape unhurt, if not to brighten his pathway while living, at least to soften the sunshine that falls upon his grave.

These lovers of

"Silvery oak-apples, and fir-cones brown,"

these cherishers of early memories, and rustic images of peace and contentment nestling under tall elms and amongst grey hawthorns, will not sneer at the idea of suburban bee-keeping, but will welcome whosoever shall shew them that the joy is possible—that they may have the companionship of their old friend the bustling confectioner, humming over the daily work wherever there is a sufficiency of garden-ground for the stall, a daily blink of sunshine, and access to the honey-market of gardens and meadows a few miles beyond. For the bee is a free roamer, she does not care for the raw material on the spot, but travels far for the treasure, and, like man himself, sets a high value on that which comes from a distance.

The pleasures of bee-keeping are not trivial, nor are the advantages few. If only for the flowery life she leads, it must be wholesome to have this merry worker about us, humming all day of

"Tendrils green, of every bloom and hue,
Together intertwined, and trammelled fresh:
The vine of glossy sprout; the ivy mesh,
Shading its Ethiop berries; and woodbine
Of velvet leaves and bugle blooms divine;
Convolvulus in streaked vases flush;
The creeper, mellowing for an autumn blush;
And virgin's bower trailing airily."

But the highest pleasures are those the observant mind will derive from a study of the economy of the hive, wherein we see displayed a social scheme

of an intensely practical character, working out its results by means of order, industry, and skill; subject to none of the flaws which beset the plans of human theorists, but perfect in its minutest details, and as instructive to the student of political economy as to the lover of nature and the searcher after wondrous truths. Here is a perfect queendom with its three estates of sovereign, aristocracy, and workers. Here is the division of labour in practical operation; here chemistry and mathematics are made subservient to the wants of life; while respect for persons, obedience to authority, industrial activity, patience, and concord, give a moral completeness to the miniature world within, which renders it so striking a picture of what the human world without *should be*, that to have such a scene at our command through the windows of an improved hive, must ever rank one of the finest pleasures of the observer of nature.

The educational uses of such rustic ornaments as are here introduced, to those who love homely pleasures and communion with nature, are of the highest value in opening the minds of the young, and giving renewed zest to the recreative hours of the mature; and none so fascinating, so replete with food for curiosity, so suggestive, so likely to improve the head and refine the heart, as the colony of bees conspicuously placed, ingeniously plying their tasks under our every-day gaze; the emblems, in all time, of industry and thrift, and the most entertaining beguilers of a spare half-hour.

The increased attention paid to bees of late years indicates an increased appreciation of their moral as well as physical attributes. To the growing fondness for these highly-endowed but modest rustics, we are to attribute the many improvements for the humane treatment of them, which promise ere long to banish all the black associations of wanton and unnecessary slaughter which has so long impeded the culture of the bee, and kept aloof so many who could not purchase pleasure by the infliction of injustice and cruelty. It is now so well known that no bee-keeper can kill even a single bee except to his own cost, that the pleasures of the apiarian are unalloyed, while his profit increases with every act of kindness that his skill and benevolence enable him to perform. There is nothing more domesticating than the love a good bee-keeper bears his bees, except, indeed, it be the love of his God, his wife, his children, and his friends: may such love increase and be its own reward.

Next to these, and of a different sort, but still improving to the nature, is the tender regard we have for these helpers of our lot, who cheerfully

give us of their store, making more than they need in their active, persevering, and serious endeavours; while every bee-keeper knows that the bees love him in return, get used to him, and allow him to come amongst them at times when none other dare approach, and cheerfully submit to a very hard fate if he imposes it, having faith in him that he will do no wrong. If we could here unravel, as fully as the subject deserves, the history of the bee, and detail the structure and operations of the hive, who would read and live another day without setting about having the means at hand at verifying for themselves all that Schirach, and Reaumur, and Huber, and Lord Brougham have said and written on the subject? And that is the great pleasure of bee-keeping—to be able to verify facts already known, but too wonderful to be believed till we have seen them, and to hope some day to discover new facts ourselves. For such a pleasure the observer of nature will ever cherish the bee, though it cost him much; but if he can be gratified at no cost, but greatly to his profit, (speaking in the worldly sense of commercial gain,) who would not wish to share the pleasure, and find in the apiary the best-drawn pictures and the best-written books?

As to the advantages of bee-keeping but little need be said, because the products of the bee have been famous articles of commerce ever since the first caravan set out on its first mission of barter. But there is one service, not everywhere recognised, which the bee performs for the horticulturist, deserving of mention here. The bee is the great fertilizer of flowers. Without his help but few of our plants would produce seed, and therefore he is somewhat a purveyor of fruits as well as honey, helping to insure the husbandman's harvest, and to perfect the seeds of the choice flowers on which the florist lavishes his love and enthusiasm. Did not the bee bustle in and out of the blue-bells at the proper time, sprinkling and brushing the fertilizing pollen-dust over the half-hidden stigmas of flowers, it is questionable if many tribes of plants would not pass out of existence, while others would be but scantily spread, which now prosper in abundance.

"The bee transports the fertilizing meal
From flower to flower, and even the breathing air
Wafts the rich perfume to its appointed use."

Now, as to the honey, Mr. Taylor, one of our highest authorities, says, "I have known as much as eighty or ninety pounds obtained from a stock

by deprivation." Such results, however, are rare, and Mr. Payne estimates the average harvest at from twenty to thirty pounds annually from every good stock. A great honey harvest, however, is not to be expected in the neighbourhood of a town, but we shall be able to show that even there good honey may be grown in plenty—more than enough to repay abundantly all the bees may cost.

This may be taking a sordid view of so noble a pleasure as bee-keeping: but a practical basis gives stability to an ideal superstructure; and most of us love gain, however small, as an apology for pursuits which lie out of the beaten track of our every-day duties. There is not a lady from Belgravia to Bow, from Park Village to Peckham, but takes an interest in sweets, cordials, perfumes, and confections, and there are few families but might use honey more extensively than they do, for economy, for enjoyment, and for health. We find a finer flavour in fruits of our own growing; our children prize the one peach which the one neglected tree produces, and when we grow honey for our own consumption, it is really sweeter than any we can purchase. In every corner of our land the well-wishers of our race cry to their neighbours, "keep bees! keep bees!" and wherever bees are kept the ground seems sanctified to the genii of homely comfort, hospitality, virtue, elegance, and thrift.

There remains the question, which should be disposed of here—*Can* bees be kept in towns in any other state than that of wretched exiles from their proper home? Is it absolutely necessary to dwell in the country to enjoy the pleasures of bee-keeping? or are bees constitutionally adaptable to circumstances, capable of the transition from rustic to urban scenes, without curtailment of life or deterioration of faculties? We answer that wherever sunshine and air have free access bees may be kept, even in the most crowded parts of a great city, though better, of course, in its suburbs, and best of all in the open country, within reach of hedgerows and commons. All they want, as to position, is a free circulation of air, morning and midday sun, a free causeway—which their wings will ensure them anywhere—to the country, and immunity from the vibration of machinery, and the effluvia of factories. A garden is not even necessary, a window affords an excellent locus, and professed apiarians frequently fit up their observatory hives in such a position.

The ordinary rate at which bees travel is estimated at thirty miles an hour, and it is well known that however rich a garden may be in flowers, bees prefer to roam away in search of honey; for the bee is eclectic, and will pass a hundred blooms before alighting on one, and when she alights, it is often to do

no more than just poke her nose in, as much as to say "good morning," and goes on again, making a long journey before fairly settling to work.

The author of the "Essay on the Honey Bee" says, "We believe that two miles may be considered as the radius of the circle of their ordinary range, though circumstances will occasionally drive them at least a mile more." The adventurous person who kept bees for many years *in the garret of a house in Holborn*, performed an experiment to ascertain how far, and to what pasturage, his bees travelled. As they came out of the hive in the morning he sprinkled them all with a red powder, and immediately set off to Hampstead, thinking it most likely he should meet them there. What was his delight at beholding among the multitudes of humming workers, some of "his own little fellows which he had 'incarnadined' in the morning." From Holborn to Hampstead Heath is about four miles, and, if this is more than the ordinary range, it at least shews how far bees will travel rather than come home empty handed. Mr. Huish states that he observed bees on the Isle of May, at the entrance to the Frith of Forth, which is distant four miles from the mainland, though there was no hive on the island, and the journey was made across water on which they could not rest in their progress. There can be no fear, therefore, but the bee will find pasture, though he have but a mural home.

Dr. Bevan says, "Those who reside in towns may consider it indispensable to the success of an apiary, that it should be in the immediate vicinity of good pasturage, and be thereby deterred from benefitting and amusing themselves by bee-keeping. It may be satisfactory to learn that the apiary of the celebrated Bonner was situated in a garret in the centre of Glasgow, where it flourished for several years, and furnished him with the means of making many interesting and valuable discoveries, which he gave to the world about thirty years ago." Mr. Payne, the author of an excellent work called the "Bee-keeper's Guide," kept an apiary, for many years, in the middle of a large town, where it afforded him both profit and amusement, and flourished in a manner worthy of a heath tract.

The apiary at Stoke Newington is represented at page 229. It is nothing more nor less than an open shed, with a little rough rustic work for embellishment. During winter it is enclosed with boards, openings being left of course for the bees to take exercise as they please, but from the beginning of March until the end of October it is quite open, as it appears in the sketch. During thirteen years, the exact distance of this apiary from the General Post Office, measured as the crow flies, was three and a half

miles. It has been lately removed to a distance of five miles or more from the same centre, owing to the vast increase of buildings, and the consequent disappearance of gardens and hedgerows in the old northern suburb. During the thirteen years when our bees were true Londoners, the average take per hive was about 10lbs. This will appear a low average to one who has practised scientific bee-keeping in a good bee country, and especially so when we add that during the whole of the period we never had in use any but large wooden hives, such as "Stewarton's" and "Tegetmeier's." It so frequently happened that the bees made no more than enough for themselves in the course of a whole season, that the average is a low one, although from first to last we were abundantly supplied with honey, and in good years had large harvests. Our experience with hives of many sorts prior to our settling down at Stoke Newington, convinced us that fanciful hives and straw hives of all kinds were but miserable makeshifts, and that it mattered not whether one lived in town or country large wooden hives were by far best suited for the production of strong colonies and heavy harvests. It was in order to encourage, as far as example might tend that way, the practice of bee-keeping in suburban districts, we exhibited the produce of our apiary during seven years consecutively. It was not at all an uncommon occurrence for our honey-boxes, weighing from eighteen to twenty-five pounds each, to be pronounced equal in quality to the finest produce of the best bee districts; and in truth, it was generally many degrees whiter than the average of country honey. The last occasion of the public exhibition of the produce of the Stoke Newington apiary was in 1864, when a beautiful sample was sent to Messrs. Neighbour and Son, and by them submitted to public notice in Regent Street as "London Honey," during a period of three or four months. Our best samples were always obtained from powerful stocks on which empty honey-boxes were placed at the end of May; these boxes being taken away filled with the produce of our little workers by the middle of August. The purity was due to quickness of production during the short period when the atmosphere of the metropolis is at its best, there being then comparatively few fires burning. When it happened that the boxes were not filled by the end of August, we either left them for the bees to remove the honey to the lower compartments for their own use during winter, or, having removed them, set them aside to be put on again the next season. Whenever a box was taken later than the middle of August, the comb was dark coloured, and the honey last deposited in all

the outer parts of the combs was less pure than that obtained from quickly filled boxes. It is agreeable to add to this note on our own suburban bee-shed, that Mrs. Hibberd has always taken the greatest interest in the prosperity and management of the bees, constantly assisting in the bold process of honey-taking that is practised here, and that will be described further on. What shall we say to timid people who would keep bees if their fears were not as to this particular matter their masters? Perhaps they may cast their fears to the winds when they learn that the *bee-mistress* at Stoke Newington is a confirmed invalid, familiar with pain and weakness, and not quite unfamiliar with the prospect of death. But a honey-taking acts upon her as a charm, and she will, without any protection or any device whatever, with uncovered face and hands, remove the bees from a large box of honey by the dexterous application of a feather between the combs, and a few persuasions that practice and confidence alone can teach. Possibly this little personal relation may comfort many who are halting between desire and fear, and undetermined whether to love bees with the love they are entitled to, or yield to the "creeping of the flesh" they experience whenever the thought of bee-keeping comes again upon them.

After all that may be said, bee-keeping is better vindicated by sentiment than utility. Honey for the soul the wise will find in it; every possible view of the subject seems to melt into poetry at last. Abraham Cowley's song of the grasshopper may serve as an inscription for the apiary, and the bees will not mind much that it was not written for them.

Happy insect! what can be
In happiness compared to thee?
Fed with nourishment divine,
The dewy morning's gentle wine!
Nature waits upon thee still,
And thy verdant cup does fill.
Thou dost drink, and dance, and sing,
Happier than the happiest king!
All the fields which thou dost see,
All the plants belong to thee;
All that summer hours produce,
Fertile made with early juice.

CHAPTER II.

A SHORT HISTORY OF THE HONEY BEE.

Thou cheerful bee! come, freely come,
And travel round my woodbine bower!
Delight me with thy wandering hum,
And rouse me from my musing hour!
Oh! try no more those tedious fields,
Come, taste the sweets my garden yields;
The treasures of each blooming mine,
The bud, the blossom, all are thine.

PROFESSOR SMYTHE.

SINCE it is impossible, in a work of this kind, to attempt anything like a full history of the honey bee, a few particulars only will be attempted, as introductory to a code of bee management; the culture of the insect being, of course, based on its constitution and habits.

An ordinary well-stocked hive contains from fifteen to twenty thousand bees. Dr. Bevan estimates that hives managed on the depriving system have their numbers sometimes swelled to fifty or sixty thousand. In their wild state there is no doubt they frequently exceed this number, owing to the vast extent of space which a colony usually has at its command. Two thousand bees will fill a pint measure, and five thousand weigh a pound. A swarm ought never to weigh less than four pounds; sometimes they reach to six, which will give a total of thirty thousand bees. We are of course glad to hive swarms of two or three pounds weight, and if we obtain these small swarms early, they may form strong stocks for the following year.

A community is made up of three kinds of bees. The first in importance is the queen, or, as she is called by the Germans, the mother bee; for she is the mother of the whole community, and maintains a sovereign command over the affairs of the hive. The next in importance is the worker, or neuter bee, which is really of the female sex, of similar constitution to the queen, but undeveloped, and hence differing from the queen both in size and appearance, and in the capacity of reproduction. The third kind is the drone, or male bee, which exists merely for the propagation of the species, and is doomed to perish as soon as a continuance of the race has been insured.

The queen is the largest of the three, and has a tapering body one and a half times the length of the worker. Her sole province is to lay eggs, and thus supply a continually increasing population. The queen is seldom seen, yet, as it is sometimes necessary to capture her, the bee-keeper should be familiar

Queen. Worker. Drone.

with her form, as represented in our engraving. The queen usually begins to lay on the fifth day after her arrival at maturity, and continues fertile for four or five years, producing during the season of her greatest productiveness, from one to two hundred eggs a day, indeed as many as one hundred and thirty-five eggs have been counted as the produce of a single night. They are united at the bottom of the cells, and are of a long oval shape. Though queens differ as to fertility, the average production of eggs is estimated at from sixty to eighty thousand a year.

The queen is the soul of the hive; where she goes the bees follow, paying homage to her and studying her wants. Remove her, and the operations are immediately suspended; the peaceful orderly industry is changed to confusion. Honey is no longer stored up for future use; the bees are content to live from day to day; it is not for themselves they labour. The queen, separated from her subjects, becomes rejected, pines, refuses food, and dies. Yet when

an emergency removes the queen at a time that the hive is full of unborn brood, the bees, once convinced that their queen is lost, select a few of the grubs of common workers, and, by a peculiar course of treatment, secure the development of the sexual organs, and thus, as it were, create a queen. This process has been witnessed, and repeatedly confirmed, and is one of the many wonders in the general economy of the hive.

The workers are the smallest and most soberly-coloured members of the community; their form and appearance are well known. They constitute the bulk of the inhabitants of a hive, the drones seldom numbering more than fifteen hundred, while the workers reach as many thousands. A brood of common workers is almost always to be found in a hive; they are the first eggs laid by a young queen, who continues to lay worker eggs only for the space of eleven months during the season. These eggs are hatched in four or five days, and remain in the grub form for about six days longer; they then pass into the chrysalis or nymph state, and spin themselves a cocoon. In about twenty-one days from the first laying of the egg, the young bee issues from its cell, and in another day or two makes its first roaming expedition to gather honey in the fields.

Worker bees are short-lived, and the abettors of the destructive system of bee-keeping adduce this fact in defence of their cruel theory, alleging that if not destroyed by art, they only suffer a lingering death, worse than the more merciful one of sulphur. But the fact of their short existence is no defence of suffocation—rather the contrary; the six or eight months allotted to a bee affording the best argument for making the most of it while it lives. As early as February there is an increase in the number of workers. During the summer the breeding goes on rapidly, and there is an enormous increase, and if common straw hives are used, swarms go off, sometimes to the disadvantage of the proprietor, for the parent stocks are weakened by the loss. Here we see the advantage of large boxes which are unfavourable to swarming, but when a swarm is sent off from one of them, it is, generally speaking, a large one, and prospers from the first.

The bees bred in the early part of the year are dead before winter, and "every bee existing at Christmas was bred during the latter part of the spring or summer." By preserving the lives of these we have a sufficient number of nurses to tend the brood-combs in spring, and these, having performed their kindly office, die in their turn, and leave the hive stocked with a large and vigorous population of young bees. In depriving hives, the workers die as

soon as they become useless, and to exterminate them before their natural period is complete is to lose their services at a time when they are of the greatest value—namely, in fostering a strong population for the ensuing summer's work. Paley says, "A bee among the flowers in spring is one of the cheerfulest objects that can be looked upon. Its life appears to be all enjoyment; so busy and so pleased."

The drone is the butt of all who have written on bees. He is only tolerated, not cared for, by the worker bees. He lives in idleness and gluttony; gathers no sweets, performs no labour; is a mere voluptuary, and dies at last a miserable death, the consequence of the disgust with which his laziness has inspired the whole of the industrial population. In a good stock-hive there will be from one to two thousand drones at the beginning of May; these are the produce of the first-laid eggs; two months afterwards there is commonly a second laying of drone eggs, which appear in public twenty-five or twenty-six days afterwards. These two generations of drones meet with two separate but determined massacres, the first slaughter of the voluptuaries taking place in June or July, the second in August.

Various duties have been assigned to drones. One author fancied them "hewers of wood and drawers of water" to the establishment; and others have thought that they brooded over and hatched the eggs like hens, "in which case the hair on their tails would seem to serve the same purpose as the feather-breeches which Catharine of Russia had made for her ministers, when she caused them, as a punishment, to hatch eggs in a large nest in the antechamber." It is all very well to make jokes at the expense of the drones, let us agree that they are wanted or they would not exist; and, as to their ultimate fate, it must be admitted that the bees themselves are the best judges.

Let us now briefly consider the internal history of a hive of bees, as upon the details of this history we must base our method of management. In February the breeding of young bees commences, and the thin population of the hive is soon augmented by fresh bodies of young workers. Towards midsummer the crowd becomes so great that the old queen and a number of the workers prepare to depart and found a new colony. Supposing them to swarm, and the swarm to be hived safely, the first thing the bees do is to clean out the new hive, block up all its chinks, fix it by means of a resinous substance to the hive-board, and varnish it all over thoroughly within.

The first material they seek is the resin of willows, poplars, alders, and birch trees; this they prepare till it becomes a greyish brown tenacious kind

of cement, being firm in texture, and aromatic. With this they cover all protuberances, and sometimes contract the entrance to the hive with it, the latter use having given rise to its name *propolis*, meaning "before the city."

While one body of workers is engaged in the work of plastering and varnishing the hive with propolis, another set are laying the foundations of combs. The cells of the combs are made of wax, but the combs are attached to the roof by means of propolis. A large number of cells is usually made the first day that the hive is taken possession of. They have been known to construct a comb twenty-seven inches long, by seven or eight inches wide, in the space of twenty-four hours; and in the course of five or six days they will half-fill the hive; hence it appears that in the first fifteen days after they take possession of a new habitation, there is as much wax made as they elaborate during the remainder of the year. The wax is secreted by workers, who first feed on rich saccharine food, and then repose in clusters till the wax scales are formed under the rings of the abdomen.

There are three sorts of cells; the first are for the larvæ of workers, the second for those of the males or drones, the third are the royal cells. Worker brood cells are usually in the centre of the hive, drone cells around these in patches, and queen cells are invariably on the outer edges of the combs. An inattentive observer might perhaps be led to infer that the various cells composing a cake are little habitations in which the workers might repose themselves after the labours of the day, each in his own house. This, however, is not the fact, for some of these are filled with honey, and others closed up, though when starved out the helpless creatures creep into them and there perish. On a more careful inspection, it will be seen that most of the cells contain a little worm—the young of the bee—an object evidently of the most anxious care and attention to those appointed to watch and feed them.

The results of these varied operations are even more wonderful than the orderly industry with which they are conducted. The combs are usually suspended from the top of the hive, each comb being formed of two layers of six-sided cells, united by their bases. The combs do not touch, but are separated by intervals sufficiently wide to permit the bees to work at the surface of each contiguous comb, and approach any cell without touching each other. Besides these highways, there are narrower causeways for ready communication between one portion of a comb and another.

The cells are usually placed in a horizontal position, so that their mouths open towards the sides of the hive. The bottom of every cell, instead of forming

one flat square, is composed of three lozenge-shaped pieces, so united as to make the cell end in a point; consequently the whole is a hexagonal tube, terminating in a pyramidal cavity.

The combs, or clusters of cells, are arranged in vertical and parallel plates, with a space of about half an inch betwixt contiguous pairs; and each comb is nearly an inch in thickness. At the outset, when one wax-making bee leaves the suspended cluster alluded to, and lays the foundation of a cell, others follow in rapid succession, not only adding their wax to that of the first, but soon commencing new combs, one on each side; and so the work goes on, in most cases, until the whole roof is covered with foundations. The architects proper, also, are meanwhile at their finishing work. They have, says Reaumur, to solve this difficult geometrical problem:—'A quantity of wax being given, to form of it similar and equal cells of a determinate capacity, but of the largest size in proportion to the matter employed, and disposed in such a manner as to occupy the least possible space in the hive.'

Wonderful to reflect upon, this problem is solved by bees in all its conditions, in their construction of hexagonal or *six-sided* cells. The square and the equilateral triangle are the only other two figures of cells which could make them all equal and similar without interstices. But cells of these figures would have either consumed more material, or have been weaker; and they would also have consumed more space, being less adapted to the form of the bee. In short, the hexagonal form combines all the requisites of economy and capacity. Another wonderful arrangement is seen in the construction of the bottoms of the cells. Each of these is composed of three rhombs, or plates of wax in the shape of card-diamonds, disposed in such a manner as to form a hollow pyramid, the apex of which forms the angles of the bases of three cells on the opposite side, giving to each of them one of the three diamond-shaped plates required to form their bases. The three rhombs, composing each cell-bottom, have the two obtuse angles each of 110 degrees, and, consequently, each of the two acute angles of 70 degrees. So far Reaumur.

The cells of the bee are extremely delicate, two or three plates or sides being of the consistence only of a common leaf of paper. They are made strong, however, by mutual support and other means. Besides a sort of froth which the insect mixes with the wax, the cells, at first of a dull white, soon appear yellow on the interior, the change arising from the plastering over them of a compound varnish of wax and propolis. Each cell is soldered, too, at its mouth, by a similar compound of a reddish colour, having in it more propolis;

and threads of the same substance are laid around the walls, to bind and strengthen them.

It is now to be observed that all cells are not alike. They have four different uses in the economy of the hive, and are constructed variously to suit these. One set of cells is for holding the eggs or embryos of worker-bees; a second for those of males or drones; a third for those of young queens, hence called royal cells; and a fourth set are for the reception of honey and pollen. The first are generally about five lines in depth, (or less than half an inch,) and two lines and two-fifths in diameter. The cells of the young males are much less numerous, and measure from six to seven lines in depth, by three and a half in diameter. It is worthy of note, that in passing from the construction of worker-cells to those of drones, in the same comb, the architects do not alter the size at once, but gradually; thus disordering in the slightest possible degree the delicate arrangement of the bases of the cells. In shifting from larger to smaller, the same rule is observed. After the chief breeding season is over, (to some extent young bees are produced at every season of the year,) the cells, both of worker and male bees, are used for holding honey. Those made purposely for that end are chiefly marked by a greater divergence from the horizontal plane, that the honey may be better secured; and it is curious to observe that, in a very warm season, these wise insects give the floor a still greater dip from the mouth inwards. As the store enlarges, they seal up the mouth with a ring of wax, to which they gradually add concentric layers till the cell is filled, when they close it altogether—reserving its treasure for use during winter and spring. Pollen, as brood food, is kept in cells of considerable size.

The maturation of the eggs is not left to chance. Huber observes that there is a distinct class of workers, whom he denominates, in his poetical technology, *nurses*. These watch over the larva or worm with tender care, administering supplies of pollen, honey, and water, and performing other offices essential to the development of the helpless nursling. So assiduously is this nursing duty performed, that where stocks are thin, and there is much brood-comb in the hive, honey gathering is almost entirely suspended, and the bees suffer from want, even during a season of plenty, owing to their unremitting care in tending the brood. Hence large stocks thrive better than small ones, as, if labourers be scarce, the whole are occupied in the internal duties of the hive. When this happens, feeding may be necessary. As the brood leaves the combs, the bees cleanse the cells, and prepare them again for eggs or honey,

but always neglecting to remove the silk cocoon which was spun by the worm. Hence in course of time the combs become contracted in size, and the bees hatched in them are smaller: so that to keep up the breed undegenerated, it is necessary to remove the old combs occasionally, and thus compel the bees to construct new ones. The use of bar hives enables the operator to remove combs periodically, and thus prevent any degeneracy of the brood. In all large depriving hives the drones are expelled earlier than in small swarming hives,—here is another advantage of employing large wooden boxes.

Before closing this brief notice of the natural history of the bee, a few words should be said on the subject of swarming; for though it is not to be supposed that a single suburban apiary will, in these enlightened times, be established on the destructive system, yet swarming will sometimes happen spite of our precautions, especially during the earlier periods of apiarian experience. And a happy thing it is that we cannot prevent swarming, for a prettier sight than the formation of a swarm, or a more agreeable task than hiving it, is scarcely to be found in the whole range of rural recreations.

When the old queen and a number of her subjects determine to expatriate themselves, and trust to chance for a future home, there is usually a dozen or more royal infants in embryo; and as but one queen is ever tolerated in a hive, these must either be slaughtered (as they are in depriving hives) by the old queen, or she must leave to make room for one of them. The increased heat of the hive is another, though not the chief cause, as many writers have asserted; Mr. Nutt, especially, has been led into many errors through adopting such a view, and therefore the greater caution is needed on the part of those who follow him.

The thermometer affords but little help in this matter, and those who depend entirely on Mr. Nutt's otherwise admirable instructions, will be led astray. The thermometer rarely reaches 95° in a stock-hive, and swarms will depart at a temperature of 90°; indeed Mr. Taylor records one instance at 80°, and adds a note in which he says that a *very* high temperature does not accompany swarming, "for I have proved that the combs collapse and fall at a temperature a little above 100°." This experiment cost Mr. Taylor the destruction of a fine stock-hive. A swarm always consists of the *old* queen, a large number of workers, old and young mixed together, and some hundreds of drones.

Swarming is not so formidable an affair as the amateur usually regards it. The tremor with which every apiarian hives his first swarm, forms a ludicrous

contrast to the confidence with which he deals with the event when he has had some experience. Indeed so far from the bees being irascible at this time, as they are when bent on the slaughter of drones, they are more than usually submissive, seeming conscious of the aid that man may render them in their extremity, so that, with moderate skill, they may be handled without risk or the least necessity for hurry or confusion. In my own experience I never remember to have been stung while hiving swarms, and now that I am used to such work, I doff my coat as soon as the alarm is raised, and hive them *en dishabille*. The excitement is magnificent, and many a time I have had from twenty to thirty neighbours assembled to witness the scene. Once, in particular, I shall never forget it. A swarm came off on a Sunday (we have had a great many swarms on Sundays just about the beginning of "church time!") and settled in a neighbour's garden, on a spot where it was next to impossible to hive them properly. After some dallying and considering, it became evident that the case must be dealt with boldly, and I swept with my naked hand, a great mass of bees into the hive that they were intended to occupy. It was then placed on the ground at a considerable distance—say three yards at least from the spot where the swarm had alighted, and where of course there remained a great mass of bees like a heap of grocer's currants. Presently a procession commenced across the garden walk to the hive; the news spread that at such a place there was a wonderful sight to be seen. The people assembled to see "Mr. Hibberd's bees," and for full two hours they proceeded in a regular line of march two or three abreast to the hive, like the passage of ants by a well-worn track, and it proved to many on-lookers the best sermon of the day, and a demonstration of the power of a wonderful instinct, which, I hope, none of them, in this life, could forget. Never since has any similar experience occurred, and perhaps never will. Had the swarm settled in the same way in my own garden, the quick cutting down of a currant tree or some such sacrifice would have been made to render a proper hiving of the swarm practicable. Generally speaking, swarms alight in positions where it is the easiest matter in the world to deal with them properly and effectually.

The swarm seldom proceeds far before it alights, and usually takes up its position on the nearest tree or shrub. When this happens in an old-fashioned village, where depriving hives are regarded only as toys for the curious or insane, it is the scene of one of the most pleasing events in the round of rural memorabilia. Away go the dames and the damsels, beating frying-pans, saucepan lids, ringing bells, and making such a clatter as rouses the village from

its noontide lethargy, and sets the whole population, including, sometimes, the parson, the schoolmaster, the beadle, and the gouty squire, to a game of hop, skip, and jump, till the bees, having clustered, and the bee-master, "big with importance," having brought an empty hive, and mounted a table under the tree, where they hang like a shower of tea-leaves, sweeps them into it, and, with his swarm safe, leaves the hubbub to subside by gradual evaporation.

The new swarm should be at once placed where it is to remain. It is the custom in the country to let it remain till night, before assigning it its proper place, but all experienced apiarians agree in condemning the practice. The lives of many bees are sacrificed every time a hive is shifted, and at the critical period of swarming they should be disturbed as little as possible. In fact, the swarm once hived should be conveyed to its proper place if possible, without leaving the hand of the operator at all, and many valuable lives will be saved in consequence. Where unusual difficulty attends the capture of a swarm, it is advisable to look for the queen, who may generally be found by the extraordinary clustering of the bees around her. If she is taken in the hand with a few bees, and placed in the hive, the remainder of the swarm will join her in a few minutes.

To comfort the timid apiarian we will add here an instructive anecdote, which the author of the "Honey Bee" quotes from a Scotch newspaper, "of an elderly gentleman, on *whose face* a swarm of bees alighted. With great presence of mind he lifted up his hat, hive-like, over his head, when the bees, by their natural instinct, at once recognising so convenient a home, betook themselves to his head-gear, which he then quietly conveyed into his garden. Had he fidgetted and flustered, as most old gentlemen—and young ones too—would have done in his situation, he would doubtless have presented the same pitiable object that our readers must remember in Hood's ludicrous sketch of an unfortunate *Bee-ing*."

A young swarm will frequently throw off a swarm, while the parent stock will also throw off swarms in addition to the first, so as at last to become broken up into swarms and casts. The object of the bee-keeper should be to hold these together, and by consolidating one strong community, to insure activity and regularity in the operations of the hive, which it is impossible to have where swarming absorbs the attention of the bees, and distracts them from work at the very best season of honey-gathering. There are various modes of preventing such accidents, and these will be dealt with in a chapter on management.

TWELVE REASONS FOR PRESERVING THE LIFE OF THE HONEY-BEE:—

I.—Humanity prompts us to preserve the lives of the creatures that associate with us, and more especially of those which render us special service.

II.—The honey harvest commences earlier in depriving hives, and is less interrupted by excessive heat or sudden changes of weather.

III.—In depriving hives the drones are sooner expelled, and the labour of workers is not suspended to prepare for swarming.

IV.—The stocks may be more rapidly increased on the depriving system, and more hives kept in operation.

V.—Deprived honey is of higher quality than that obtained by suffocation; it may always be had *new*, and free from the taint of sulphur.

VI.—The honey can be taken at the best period, and as it is wanted.

VII.—As swarming seldom takes place at the height of the honey harvest, there is no fear of the loss of swarms, no cause of alarm to the bee-keeper, and the work of the hive is free from interruption.

VIII.—In the old straw hives the same comb is used again and again for worker-brood, and the bees rapidly degenerate in consequence. In improved hives the comb may be periodically removed, and the population maintained in its natural vigour.

IX.—As the autumn bees live through the winter, their preservation conduces to the success of the spring campaign and honey commissariat.

X.—The humane treatment affords the best opportunities for the study of bee history and economy.

XI.—For purposes of ornament depriving hives excel all others; the latter are restricted in design as in use.

XII.—The world holds the name of Herod in abhorrence; therefore let no lover of rustic life and scenery stain his hands by a slaughter of the Innocents.

Observatory Bee-house.

CHAPTER III.

FORMATION AND FURNISHING OF AN APIARY.

First for thy bees a quiet station find,
And lodge them under covert of the wind:
But near a living stream their mansion place,
Edged round with moss and tufts of matted grass;
And plant (the wind's impetuous rage to stop)
Wild olive trees, or palms, before the busy shop.

VIRGIL.

THE formation of an apiary is a most simple affair, save that it is not always an easy matter to obtain bees to stock it. But, however simple, we may properly advance here, for the sake of obtaining attention to what follows, the grave old saw, "there is a right way and a wrong way." It is of the utmost importance in every new pursuit to begin well, and with a modest ambition. The beginner who trusts over much to money, without being sure of his possession of suitable taste and judgment, may command a great apiary into existence with but little more trouble than the wizard on the stage, who by a wave of the wand orders up through the trap a ready-made banquet for the entertainment of a prince in an enchanted castle. Apiaries formed in that way rarely prosper: they are as unmanageable as a family of a dozen children would be to a couple who should suddenly become parental to that extent, having never had a child in their house before. The apiary that has grown from small beginnings is the one we should look for if we wanted lessons in practice, and the entertainment that one who has observed with interest and worked with patience can

always afford to a kindred spirit who would love a gossip on matters mutually interesting.

It is by no means an easy matter, even in a garden of considerable extent, to find a suitable spot for a bee-shed. This for several reasons, which must have consideration in the first instance. The bees must have a clear way out: there must be no traffic within at least half a dozen yards of the front of the hives. It must be confessed that at Stoke Newington for twelve years the bees stood with their faces towards the principal walk, and only about eight feet distant. But at honey-taking times we used to prohibit any one but ourselves going into the garden, and if visitors arrived they gave but little trouble after being admonished that the bees hated strangers after they had been robbed. Any way there ought to be no traffic near the front of the bee-house; the bees must have an open causeway out and home, and they must look east, south-east, or south. Ours stand now facing south-east with an open causeway where traffic is impossible, with half a mile at least of meadow land full before them, before they can reach any pathway or public road. It is not because bees are dangerous that this rule of an open causeway should be observed. When the honey is taken, they make it known, if any opportunity is afforded them, that they have just a shadow of a temper, and power to demonstrate the fact. At such times strangers should be kept out of the way, and if the apiary is so placed that strangers cannot be kept aloof, then all that remains to be said is that the apiary is badly placed. On all ordinary occasions bees have not the least idea of stinging; in fact, a bee going about her business must be annoyed considerably, ere she will waste her time to punish the enemy. So in taking a swarm, it may almost be said they will never sting: at all events none but a bungler or a very timid person will be stung by them. Give them a good causeway then, not looking on a croquet lawn, or a much frequented path, or where any kind of labour is customarily performed.

Another requisite of a good position is ample space for approach in the rear of the hives. The apiarian will, let us hope, have heavy weights to lift, and sundry small mechanical operations to perform, for which he must have room for the free use of his limbs. When a swarm has been taken, it should be brought in at the back of the shed, and be placed on the stand where it is to remain; it is a most improper procedure to bring it in the front way—in fact, the bees will not be bothered with people in front of the shop; they want no publicity, and we must humour them if we want honey.

At the risk of appearing tedious we repeat that these two preliminary conditions are of great importance. But it must be remembered that bees care nothing about scenery or indeed propriety. They will sail across a wood-yard or a melancholy marsh with as much gladness as over a flower garden, or through a labyrinth of costly statuary, provided they can find their way to suitable pasture. When in full work, they generally rise up high into the air immediately after quitting the hive, and no one can say where they are going to; but in coming home laden, they sail low, and cannot abide interruption in regaining the hive. Therefore we may plant our bees in any clean dry place, whence they can go out freely in any aspect from due east to due south, mid way between these points being best, and where also we can find room in the rear for necessary manipulations. An arched recess in the wall of the house forms a capital site for an apiary, if fulfilling the primary conditions. The best apiary we know of is in a stable, which, being no longer required for its ostensible purpose, was slightly altered for the bees. One of the walls facing the south-east was pierced with holes at proper distances to suit a row of hives. A shelf was placed against this wall, the hives were put in their places, and the bees went on with their work happily, and it was a rare occurrence to find a bee in the house itself—they were too particular to keep to their own porches and halls. The windows on the north-east side afforded abundant light for the bee-keeper's operations; the stall occupied only a width of three feet at most on the wall appropriated to it, and the other part of the place was used as a tool-house, and a store for roots. "The best apiary!" yes, not for any outward elegancies, but for the glorious work that was done, for the owner knew how to handle bees, the country was rich in bee pasture, and great honey harvests were sent from it, and were eagerly purchased at the rate of half-a-crown per pound. "Thou shalt not put thy trust in horses," said the bee-master one day as he lifted a box of honey weighing twenty-five pounds, and said that it was one of the purest samples his little workers had ever given him.

Next as to the apiary itself. Bees thrive better sheltered than exposed, but a free circulation of air about the hives is of great importance, not so much for the bees themselves—for they practice ventilation without help of Mr. Chadwick, or studying the theories of Dr. Reed. In desperately hot weather, the combs will melt and fall within the hives if they become over-heated, and a free ventilation is a grand cooling agent, provided at the same time that the direct rays of the sun are screened off. To make this

part of the subject plain, let it be understood that any kind of shelter will do, for the bees care not one straw what it is if they are but dry, and can breathe the free air of heaven. But a caution here. A low thatched roof standing just above the hives, will in summer time be always full of spiders, and to dislodge these vagabonds is simply impossible. Before we took up our residence in Stoke Newington we had a pretty low-roofed thatched cottage for our bees, and the spiders were a perpetual nuisance. In hot weather spiders may swarm about the house and do no harm, for the bees pass through their horrible meshes unhurt; but when the foggy mornings and chilly damps of autumn come the poor dears are trapped wholesale, they stick fast in the wet webs, and the bees being then weak and the spiders strong, the first fulfil the undesirable purpose of making the second fat. To see a bee fight with a spider, and the spider invariably get the best of it, is a pretty study for the apiarian, but the less of it the better. Our bee-shed consists of a hipped roof of timber supported on stout uprights of larch with the bark on, over the timber is laid felt well pitched and dusted with sand. It is open on all sides, but in winter is roughly boarded in, for our Hermitage is in a miserably bleak spot—Stoke Newington is a fine imitation of the arctic regions, considering we are only five miles north from the General Post Office. Measurements are useful. The width of our roof is twelve feet, and the height from the ground eight feet, affording ample shelter from driving rains and also ample head-room for lifting, which, as will be seen presently, is a matter of no small importance. It matters not what the length of the house is, but where space is a matter of consideration, a semicircular or half octagonal form may be adopted, as in the apiary represented at page 250. In such a case one side will face due east, and the other side due south. Perhaps a point or two beyond these extremes may be allowable, but we cannot say from experience how far north and west aspects are allowable.

It will be understood from what has been said so far, that hives on stands exposed to all weathers are not recommended. Certainly not. Yet we see hives on stands with straw or earthenware protectors to throw the rain off in cottage gardens, and some very good honey is grown that way. The fact cannot be denied that bees are delightfully accommodating, but the best way is the best way, and there is nothing so conducive to success as shelter, for after all, the honey bee is a domesticated insect, and all domesticated animals are the better for shelter against the rigours of this horrible clime. Damp is more injurious than frost: in fact frost is scarcely hurtful to bees that have plenty

to live on, but damp will bring dysentery, and food is no antidote to the destruction that ensues when that disease breaks out.

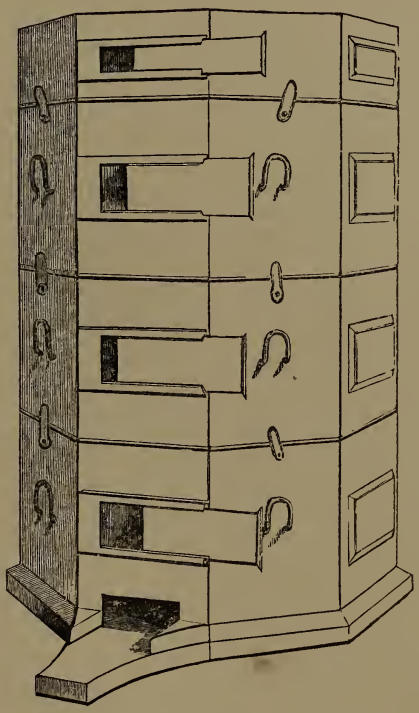
Now as to hives. Large wooden hives have been spoken of already as the best. But as we have taken many a fine skip of honey from straw hives, and once believed in them for the sake of the picturesque, they are not to be condemned *in toto*. The prosperity of a community depends in great measure on its size, and only in the large wooden boxes do the bees accumulate sufficiently to make powerful stocks—swarms are of less importance than honey, but when a swarm does come from a large hive it is pretty sure to be a large swarm, and doubly worth the hiving. The apiarian who means it, will prefer wooden hives always, and will soon learn to regard all that is said against them for the purposes of favouring straw hives as rubbish which should be "cast to the void" and forgotten for ever. Now as to fancy hives. They have been condemned already. Yet they have their uses. They please people, they look pretty; they make nice features in sentimental pictures of country life: let us not be utilitarian to the core, but allow to fanciful hives a place in the world if they win for the bees immunity from the penalties of prejudice, and an increase of that abiding interest through which alone they can become the ministers of peace, plenty, and progress in the English household.

As before remarked, bees are not particular. You might hive a swarm in an old pail, and if there was a chink in the rim through which they could pass in and out, they would thrive as well as in the most costly hive ever made. Of course when you wanted honey you might have to turn up the pail, and cut the combs out, an operation which a novice would be puzzled to perform, and therefore a properly constructed hive is to be preferred to a pail. But given facilities for necessary operations, it matters little what is the form of the hive; if too large, the bees may perish of cold ere they can fill it with comb; if too small, the proprietor's prospects are prejudiced, for in small hives it is impossible to raise strong communities. Hence there is a philosophy in bee-hives as in all things else.

We employ now only two kinds of hives, the Stewarton and the Tegetmeier. As for the last, it is almost too good, for it is but a square box; the other is octagonal. And here, before we forget it, we must say a word on the philosophy of the "depriving system," for that is the system which the sensible apiarian must follow: we decline to recognise the suffocating system, the country wives must follow it, because they *will* be obsolete, and sacrifice a pound to gain a penny. For the depriving system, a number of hives, varying more or

less in size, form, and arrangement, are provided by manufacturers. They all agree however in conforming to one primary principle, in that they consist of two or more parts, one of these being intended as the permanent home of the bees, the other, when filled with honey, as the wages of the bee-master. We hive a swarm of bees into a box, say. In due time the industrious creatures fill it with comb, the comb itself being filled with brood and honey. We have no intention to disturb any of this comb, it belongs, we say, wholly and solely to the bees, it contains the larvæ or immature insects that will by and bye constitute the colony, and it contains also the food of the present population —it is not to be disturbed. But some time in the month of May we make an opening in the top of the box by withdrawing a few slides, and put over the original box another of less depth, but the same otherwise in dimensions and make, fitting closely to the first, and being put on hollow side downwards. Presently the bees begin to work in this second box or "super." In due time they fill it with comb, and this comb is not filled with brood and honey, but with *honey only*. At the right moment the bee-master seizes upon this box, appropriates it for his own use, leaving to the bees for their support the whole contents of the original hive. This is the merest outline of the depriving system, but it is enough to indicate that the differences of depriving hives are only proper corollaries of differences of method in carrying the system into effect. The process we have described, the essential feature of which is that the honey-boxes are placed *above* the original or stock hive, is called "supering:" when the honey-boxes are placed *beneath* the original or stock hive it is called "nadiring:" when the honey-boxes are placed *by the side* of the original or stock hive, it is designated "collateral." As above remarked, the Stewarton Hive is in great favour here. This is so called from the district of Stewarton in North Britain, where it is in general use. It consists of a series of octagonal boxes, four in number, three of them formed exactly alike, but the fourth, which forms the summit, is a little shallower than the others. The *inside* measure of each is thirteen inches and three-quarters from side to side, or from back to front; the height of each of the three lower boxes is five inches and three-quarters, the bottom open in all. With the exception of the top or shallow honey-box, the construction of each is the same; the roof is flat, and consists of seven fixed bars, each one inch and a half wide, and between each two bars are grooves three-eighths of an inch wide, which are capable of being closed by strips of wood. When the boxes are severally placed above the stock, these slips are withdrawn, to allow the bees to ascend, and they are prevented

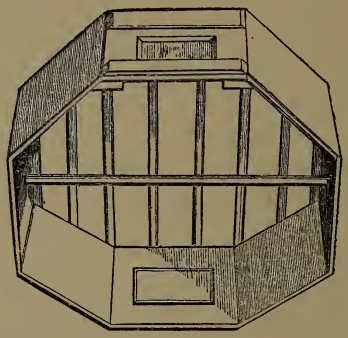
from escaping at the openings outwards of the grooves by little blocks of wood fitted in at the back of the hive. The two lower boxes have an additional *cross-bar*, to give strength to the combs. Each box has a window back and front, closed by a moveable shutter, and every one of the three larger boxes may be used as a stock-box by the withdrawal of a slip of wood from the front, which



The Stewarton Hive.

immediately forms an entrance for the bees to come and go. Of course they are worked on the supering system, or rather a combination of supering and nadiring. The swarm is hived into two boxes joined and communicating with each other. When these are filled, the super or honey-box is added. As more room is required, another of the large boxes is added *below* the stock, the

original entrance is closed by a slide, and a new one opened by a similar slide in the nadir. In the winter this lower box is removed, and the combs left in it undisturbed for the future use of the bees. The boxes are readily adjusted by means of buttons, and each has a set of hooks attached to give facilities for lifting and weighing.

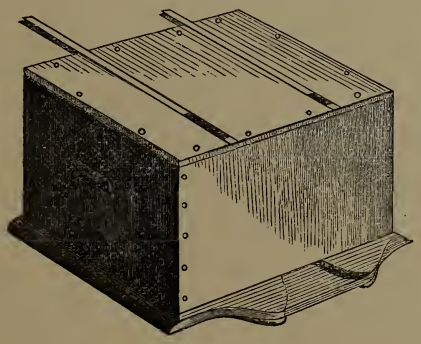


In a communication received from one who has had large experience on the Scottish moors with these hives, he says, "In a good season I have known a skilful hand take honey to the value of six or seven pounds sterling from a single hive, besides leaving an ample store for winter."

Tegetmeier's hive is a square box with bars, as shown in the figure. The floor-board is chamfered to make an entrance, which obviates the necessity of cutting a piece out of the lower edge of the box. Another box of the same lateral dimensions, but of less depth, is put on for a "take" of honey, two or three of the slides in the stock box being partly withdrawn to afford the bees access to the super. A great advantage of this simple contrivance is that failing to obtain the hive of a manufacturer trading in such articles, any carpenter, or indeed any amateur skilled in carpentry, will have no difficulty in making it. This cannot be said of the octagonal boxes, the manufacture of which requires specially prepared machinery. As it may happen that many readers will experience a difficulty in obtaining hives of this description, a few directions as to their manufacture will probably be valuable. It must be understood, then, that bees work in a most methodical manner; and although they will fill any dry vessel, such as a basket or box, in their own way, it is

far better when we construct boxes for them to make the dimensions agree with the aggregate width of a certain number of combs. To our esteemed friend, Mr. Tegetmeier, we are indebted for the following particulars.

Wooden hives may be most advantageously made on one or other of two plans—either a simple box-hive, capable of being covered with a honey box, or furnished with frames, holding the combs so that each one is moveable, and can be taken out of the hive without disturbing the remainder. If simple box-hives are required, the best dimensions are 13½ inches square (inside measure) by 9 or 10 inches deep: the depth may be varied so as to have some hives larger than the others, by which means some may be adapted to strong, others



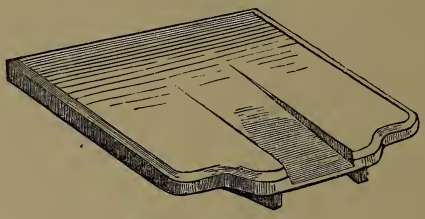
Tegetmeier's Hive.

to smaller swarms, but the width should always remain uniform, so that the parts of one hive will transfer to another. 13½ inches square is the best measurement, as, should moveable frame hives afterwards be used, the supers and hives will all correspond. To make a hive 10 inches deep of inch-wood, there will be required two pieces for the sides, each 13½ by 10 inches; and for the back and front two pieces, 15½ by 10 inches. In nailing these together, the nails should not be driven quite straight, but alternately sloping somewhat up and down, as this has the effect of preventing them being drawn out, if there is any tendency in the wood to warp. Instead of nailing, the box may be dovetailed together, if expense and trouble be not an object.

The top, which will require to be 15½ inches square, should be put on by

screws not less than 2 inches in length, and these should be well greased, so that they may be taken out readily at any future time. The wood should not be very smoothly planed on the inner side, and it is desirable, but by no means essential, that there should be a window in the back. This may be 3 inches long by 2 high, and must be darkened and protected from the extreme cold by an outer shutter, which may be hinged, made to slide, or fastened by buttons. It is very important that the grain of the wood in the four sides should run horizontally.

To admit the bees to the top box or super, which is to be placed over in the honey season, holes must be made in the top; some prefer a single large hole in the centre, but I recommend in preference two rows of smaller holes, nearer the sides. These holes, when not in use, should be stopped either by a bung



Chamfered Floor-board.

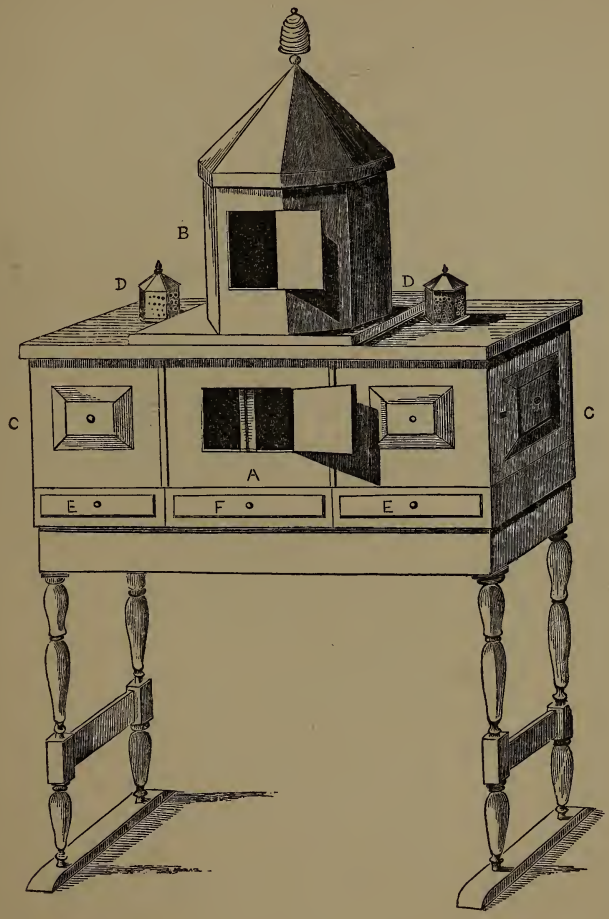
placed in each, or by a piece of wood laid on, and secured, if thought requisite, by a small screw at each end.

There is a still better mode of forming the communication between the hive and the super; that is, by forming the top in three pieces, leaving a space of half an inch between them, as shown in the figure on page 259, which represents the hive and floor-board complete.

The edges of these two spaces are grooved, and when they are not required to be open, tongued slides are pushed in, cutting off all communication between the hive below and the super above.

The entrance to the hive should never be made in the side, but always sunk in the floor-board.

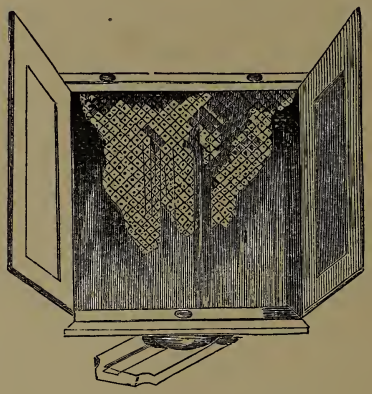
The best kind of floor-board is that shown above; the entrance is formed by half the thickness of the board being cut away, for a space four inches wide; this broad groove gradually becomes shallower, and ceases at



NUTT'S COLLATERAL HIVE.

the centre of the board. It should be formed of such a depth, that when the hive is placed over it, an entrance is left three eighths of an inch deep.

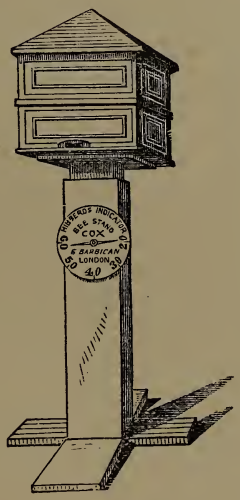
In Taylor's "Bee-Keeper's Manual" will be found descriptions of several hives, formed on the principle of the one last described, but more elaborate in detail, and much more ornamental. To that admirable work we must refer those readers who fail to see in the two forms of supering hives which we employ a sufficiency to meet their requirements. But we must not dismiss the subject without noticing Nutt's hive, which is the most celebrated of those on the collateral principle, and the unicomb hive, which is indispensable in the scientific study of the honey-bee.



Unicomb Observatory Hive.

Nutt's Collateral Hive is an imposing structure, consisting of a central stock-box, A, called the pavilion, which is stocked with a swarm in the usual way. As the stock-box becomes filled with comb, a bell-glass is worked above it, over which is placed the octagonal cover B. As indications of crowding are exhibited, swarming is prevented by withdrawing the slides which close the communication between the stock-box and the side-boxes CC, into one or both of which the bees enter, and commence the deposit of honey, which is afterwards removed without injury to the inmates, and the bees driven back to the stock-box for the winter. The winter management is facilitated by means of the feeding-drawer F, to correspond with which, for the sake of uniformity of appearance, mouldings EE, are attached to the fronts of the side-boxes.

One of the chief features of Nutt's plan was the improved system of ventilation, by means of perforated ventilators DD, which contribute also to the ornament of the boxes. The ventilation is regulated according to the temperature, and to facilitate the accuracy of the working a thermometer inside the glass window of the central stock-box A. We would rather trust to the simplest supering hive than to any other we have ever seen or heard of for a supply of honey, and although we can, we trust, fully appreciate tastefulness of design wherever taste is needed, we must confess that we regard ornamental and complicated bee-hives as toys rather than implements.

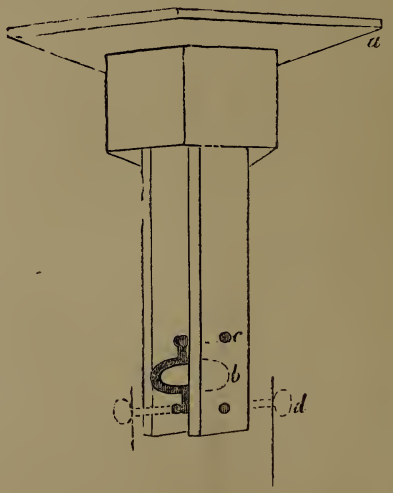


Hibberd's Indicator Bee-stand.

The Unicomb Observatory Hive is constructed to admit of *one comb only*, and it consists of plain wood frames filled in with glass. A long trough serves the purpose of floor-board, and on this the hive turns freely, so that the comb may be examined at any time on both sides minutely. As there is but one comb, and we have a fair view of every cell on both sides of it, the queen bee may always be found, and that is one of its principal uses. To a beginner such a hive as this is simply useless; the apiarian must attain to

considerable proficiency ere he can properly employ this ingenious contrivance.

In 1857 we published an account of an invention of our own for registering the daily work of a hive of bees. It consists of a hollow pillar in which is fixed a powerful spiral spring working vertically. The movements of the spring are communicated to a hand moving over a dial in front, and by adjusting the spring and the clockwork to a given series of weights, the gross weight of the hive and its contents is always indicated on the dial. There is also a marker unconnected with the spring, which can be placed at any figure at the will of the observer. If the hive weighs this evening thirty pounds, we place the marker at 30. The next evening when the bees are all home, we find the registering hand at (say) 35, and we know thereby that the bees have stored up five pounds of honey during the day. Many most interesting particulars in the economy of the hive, and the influence of weather and seasons on the work of the bee, are demonstrated by this simple instrument.



Hibberd's Indicator Bee-stand. (Vertical Section.)

CHAPTER IV.

A SHORT CODE OF BEE-MANAGEMENT.

Whether thou build the palace of the bees
With twisted osiers or with barks of trees,
Make but a narrow mouth: for as the cold
Congeals into a lump the liquid gold;
So 't is again dissolv'd by summer's heat,
And the sweet labours both extremes defeat.

VIRGIL, FOURTH GEORGIC.

IN the management of bees there is such an ample field for the exercise of skill and courage, that in these respects it may be fairly said to surpass in attractiveness all other rural pursuits of a strictly peaceable and homely nature. We have endeavoured to moderate the "rush" of an enthusiastic amateur in whatever recreation he may enter upon, by counselling content with small beginnings. We will now add to that advice a remark on the possibility of overcoming all difficulties, and attaining to complete success by a steady process of self-initiation with the least help from books possible. As we would say of ferns or auriculas, so we would of bees, those who hope to cultivate them with credit must first become accustomed to them. There is no royal road here any more than in other departments of useful knowledge, and until the amateur apiarian gets used to his bees there will not be any satisfactory progress. There are few who really handle bees well but remember vividly the trepidation that accompanied their first attempts, when it was impossible to lift a hive without excitement and trembling, and the taking of the first box or glass of honey seemed as great

a feat as capturing a city. Just because the pastime is exciting, and any blunder may endanger the safety of the operator and injure the bees, it is necessary to begin this chapter with two items of practical advice. Before doing anything with bees, first be sure you clearly understand what should be done, for when you have once begun, you will probably have to go on, even if in the very middle of the business you begin to doubt the policy of the proceeding. Secondly, go about the work easily, preserve your self-possession, make all the necessary movements with decision and a firm hand, and the moment what there is to do is properly done go away and leave the bees to regain their wonted quiet. Some bee-masters can not only perform the ordinary operations of hiving, harvesting, and so forth with dexterity, but have such command over bees that they can catch them in the naked hand and play with them. We have seen Mr. Tegetmeier do this. We say nothing of our own performances, except that there is nothing possible with bees but we should like to attain to perfect skill in the performance of it, so fascinating are the pretty creatures, so strong the attachment frequent intercourse with them engenders.

In commencing to stock an apiary, there are several courses open. You may buy some good stocks in winter, and have them transferred by the simple process of carrying. In buying give the preference to hives that have clean whitish comb, as, if the comb is very dark, it is a proof that it has been established some years, and provided the bees are strong, the younger the hive the better. An ordinary stock-box, bees and all, without supers or other accessories, should weigh, when purchased, in January or February, twenty to forty pounds; the heavier the better. If in doubt which amongst many hives to make purchase of, give the casting vote in favour of those which have been most ready to resent your meddling with them. Docility is a bad sign when a stranger is near,—it proves the hive is weak.

It is a bad plan to purchase established stocks of a near neighbour, for numbers of bees on their next sally out will return to the old spot, and be lost to the purchaser. The stocks may not be ruined by this procedure, for every day the number lost will be fewer; but whatever tends to lessen the numbers of the population is detrimental to its working power and its productive value. The books advise the removal of stocks at least three miles; in other words, if you purchase old stocks, you should go at least three miles away to buy them. Our apiary was moved a distance of about two miles during fine weather in the early part of October last, and we took occasion to be at

the old spot next day and saw a few bees buzzing about on the old site, so it was evident the distance was not sufficient to prevent loss entirely. Nevertheless only a few returned the first day, and not one was to be seen on the second. The necessity of selecting a good site in the first instance is thus made apparent. You may find after a few months that your bees are in an unsuitable spot, and if you move them at once a distance of twenty or thirty yards, or even say a furlong or so, the greater part will be lost through going next day to the old spot and there buzzing about until they perish. In such a case the removal must be accomplished at the rate of two feet or less daily—a tedious business, perhaps.

Instead of purchasing old stocks, it may be better to obtain newly-hived swarms in May or June. Good swarms well hived in the month of May, are to be preferred to old stocks unless these last are known to be in prime condition. It is well to make arrangements for swarms in good time, as the first that come off are usually the best, and have a longer season before them for work to prepare for winter. It is well also to send hives for the swarms, with instructions to the bee-master to hive the swarms into them and send them on about a week afterwards, as by that time the bees will have cemented the hives to the boards and they will travel better. If hives are not provided you must put up with whatever hives come to hand unless you are skilled in "driving;" but a beginner had best not attempt this feat, though it is one of the simplest when confidence has been acquired. There is no necessity for sending to a distance for swarms, for it matters not how short the distance from the apiary they quit to the one they are to occupy. In the event of obtaining a swarm close at hand, have it hived as soon after it has settled as possible, and take it at once to its proper destination—to wait until nightfall, for all the bees to collect in it as is usually done, is bad practice, as you will be convinced, if you visit the spot where the swarm settled on the next day after hiving it. The site of the temporary settlement will be crowded with your bees, and all you see buzzing about there will return, not to your new colony, but to the old one from whence they issued.

To carry bees any distance safely is the easiest matter imaginable. Prepare some kind of material wherewith to stop up the entrances. Blocks of wood cut to fit in closely, and a cord passed round to keep them from falling out, answer as well as anything. We have been content with a lump of wet clay pressed into the opening, but a bandage of some kind must be applied to keep it in its place. The best possible thing is a slip of perforated zinc firmly

fixed over the opening, as that allows the prisoners to breathe freely. Whatever you intend to do, make up your mind to be quick about it, for the bees will not stand much gossiping and pottering about the hall door. Some strong ropes will be required, and perhaps a few large cloths or sacks, but that will depend on the mode of carriage. Having made all ready early in the day, leave the bees undisturbed until nightfall. Then as soon as they are fairly home and quiet, stop the entrances, lift out each hive separately, and safely bind them with strong rope, so as to prevent any possible slipping of the boxes from the floor-boards. If to go in a cart, they will now be ready. If by hand, tie each hive in a strong cloth, bring the ends of the cloth over the top, and sling it to a pole for two to carry. When carefully uncorded and placed in position, allow a short time to elapse, and then tenderly remove the stoppings of the entrances and get out of the way. You have now laid the foundations of the apiary, and have but to be patient and persevering, and you will in due time rejoice that your labour has not been in vain.

Oh! knew he but his happiness, of men
The happiest he, who, far from public rage,
Deep in the vale, with a choice few retir'd
Drinks the pure pleasures of the rural life!
* * * *
Whatever greens the spring,
When heav'n descends in show'rs; or bends the bough,
When Summer reddens, and when Autumn beams;
Or in the wintry glebe whatever lies
Conceal'd and fattens with the richest sap,
These are not wanting; nor the milky drove,
Luxuriant, spread o'er all the lowing vale;
Nor bleating mountains; nor the chide of streams,
And hum of bees, inviting sleep sincere.

THOMSON.

The hiving of a swarm of bees is a business so entertaining, that a lover of the picturesque obtains a second argument therefrom in behalf of the small straw hives, and the rest of the objectionable economies of the cottager's garden. In some little hamlet we may witness on such an occasion an awakening of a most startling kind. The wives come out with pans and shovels and make a hideous banging and rattling, the boys and girls run about shouting in everybody's way, the men come in from the field and look wise about nothing, and the bee-master himself commences a performance of a most elaborate and

absurd description. He must have a bunch of sweet herbs to brush round the hive into which the bees are to be swept; he must have a lot of green branches of privet or sallow to lay over it when the bees are caught; he must have a a pipe of tobacco while the work proceeds, and a mug of brown ale when it is finished. All this while the bees have been sailing high in the blue heaven in great spiral curves, which all converge to the spot where the swarm is collecting, and which now assumes the form and appearance of a gigantic dark brown wig suspended to a branch of a tree, or an inverted cone, composed of grocer's currants wedged mysteriously into the very centre of a gooseberry bush. The dark brown mass consists of bees only; it is fringed with a flying crowd of bees still gathering from the heavens, and the commingled hummings of the crowd may be heard at the distance of half a mile, and whoever hears it and knows its meaning will partake of the excitement that prevails on the spot. Now the bee-master, swelling with a sense of importance and capability, puts on the leather gloves, which he commonly wears when trimming a thorn hedge; he ties a cloth round his face leaving only the tip of his nose and his eyes exposed, for as he says, "y' must breath, and y' must see." Then he sweeps the bees into the sweetened hive, or if they are lodged so that sweeping is impracticable, he shakes them into it, and as the disturbed mass breaks into flakes of bees that fall into the hive, and clouds of bees that scatter on the wing and fill the air with a voice that sounds like "shee-ee-er-home-ur-r-r," the women clack with delight in a very high key, and the boys and girls join in a jolly chorus of "hoo-ray," much prolonged, and perhaps repeated.

The reader will probably not need to be informed that the picturesque mode of hiving a swarm is fully as absurd as the picturesque mode of bee-keeping, which ends in putting the hives over pots of burning brimstone. You want no sweet herbs, no bell-ringing, no clatter of pots and pans: it is advisable not to smoke over the work, but a jug of ale you may have when it is done, and if you enjoy it with the relish of a bee-keeper who shall be nameless, you will do very well. Long before the month of May, hives and boxes should be ready. We make it a rule to paint and clean a few boxes every summer, for use the next summer. We were taught this "forethought" by the loss of a grand swarm in our early days of experience. The hives had been painted and cleaned some time in April, and the grand swarm was put into one, which, though dry enough to be handled, retained still a decided odour of paint. The bees were hived well enough, and collected well as the day went by, but next morniug there was not a bee left; they had quietly migrated, going away

no doubt at daybreak to a spot they had selected as preferable to a newly-painted hive. Being in readiness then, you must either wait for swarms or make them. The making we shall say nothing about here, for the subject belongs to the bee-book proper.

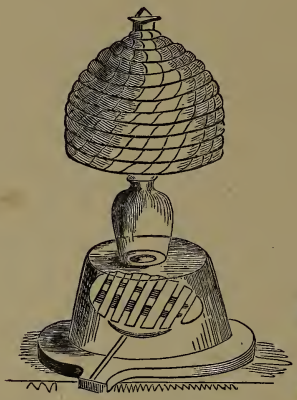
Let us suppose that on a fine morning in the latter part of May you are sauntering about the garden, and presently you notice the customary sweet music of your bee-stall increase in volume and diversity. Looking about and wondering, you perceive that the atmosphere consists apparently of bees only, all describing great spirals, wheeling up and round, and humming in a higher key than usual. Your perplexity will not last long: you will exclaim aloud, though alone, "a swarm, bravo!" Now, don't be flustered at that happy juncture. First, go quietly and provide yourself with a hive, a large flat board, a pair of thick woollen gloves; you may also want a pair of steps, a saw, a few strong stakes, etc., etc., but such wants are contingent upon the position of the swarm, and it is time now to ascertain where it has settled. Your mode of procedure must be determined by circumstances, but what you have to do is either to shake the whole mass by a sudden and firm movement into the hive, or sweep them into it, and at once turn the hive over on the flat board, and then wedge it up with a few twigs, to make room for the bees to go in and out under the edge of it. We always operate without any kind of protection either of the hand or face, for the hiving of a swarm is usually accomplished in a few minutes, and so far from being a dangerous business, the bees are less disposed to sting then than at any other time in all their lives. Having allowed a little time for the outlying parts of the swarm to collect, say a quarter of an hour at the utmost, carry the hive on the board just as it is to the place it is to occupy permanently, and there leave it. At evening dusk, when all is quiet, lift it with a steady hand, let the board be drawn away and the proper permanent floor-board take its place.

The mode by which honey is obtained on the "supering" system has been explained already, but a few words of advice on the practice may be useful here. As we have actually given more space to bees than we can afford, we must be very brief. First then, it needs a little judgment to determine whether the bees can afford to fill a cap or super for us. As a rule, newly-hived swarms should never be capped: all they make previous to their first winter they want themselves. A stock in a poor state should not be capped, for, like a swarm of the season, it has enough to do to keep

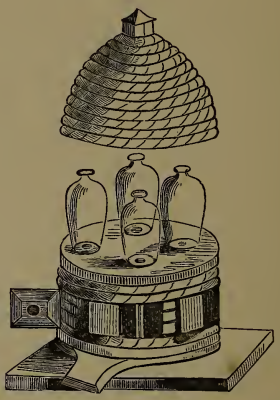
its ground. If the season is cold and wet, it is advisable to be very cautious in putting on caps, because, in the first place, the bees may not be able to fill them, and in the second, a great empty cap or super over their heads may absorb more of their heat than they can spare, and may actually cause dysentery. In the miserable season of 1860, when the sun shone for about two hours only in the space of three months, and from the end of April to the middle of July it rained almost without intermission day and night, we did not cap any of our hives, and we had no losses in the winter following, though that was the worst winter for bees that has occurred in the present century. But if the stocks are strong, and the season is a good one, and all is going on well, begin capping in the latter part of May. The process must be accomplished quickly, and therefore the operator must be well prepared for it. A chisel, large screwdriver, and a pair of pincers may be necessary, for in the case of bar hives it may need a powerful tug to draw out the slides. What you have to do, is to open the top of the stock, and immediately put over the super, or better still, if the hive allows of it, put the super on first and then draw one or two slides out.

Taking the honey harvest is the grand business of the bee-keeper's year. Towards the end of July, or earlier, the harvest should be taken. As the outside combs are generally sealed up last, the closing of those next the glass of the super will be a sign that the super is well filled, and may be taken. The first thing to be done is to loosen the super by means of a chisel or a powerful screwdriver all round the edges, and then draw a fine strong cord or wire across in such a way as to scrape the top of the stock and cut away from it any combs the bees may have sealed down. Having done this, you must close the apertures through which the bees have had access to the super, so that traffic up and down shall cease from that moment. In our early experiences we used to take honey by a plan we cannot recommend, though it may be useful, if only for its suggestiveness, to describe it. The super having been loosened, a common long clay pipe was filled with tobacco, and when well lighted the thin end was pushed inside the super, and then taking the hot bowl in the mouth, a stream of smoke was blown in amongst the bees. The box was then lifted and carried away quickly, and placed on a board in a shed. There the bees had another dose of tobacco smoke, powerful and prolonged. The box was at once lifted and carried away to another similar place, leaving a great heap of bees where the last smoking took place. Generally three good

doses of tobacco smoke were sufficient to clear all the bees out, save a last lonely remnant that under any and every system come scrambling up from below, and have to be filliped out with a feather. For many years past we have followed the system we first described in the "Garden Oracle." The honey-box being loosened, is simply lifted off and carried away, and placed on a board, so that no bees can escape from it. After about three or four minutes a few smart taps are given with a light stick on the top and sides of the box, and it is instantly picked up and carried to another place, and treated in the same manner. A quarter of an hour spent in this way is sufficient to clear out all the bees, except the usual half dozen or so that resist all ordinary



Circular Observatory Hive.



Toy-hive with four Honey Glasses.

means to dislodge them. To get rid of these turn up the box, and as the lag-behinds come up with a "ting-ing-ing" whisk them out tenderly with a feather. As for the heaps of bees you leave on the top of the hive and at the various places where the tapping has been done, leave them alone, and they 'll all go home. Don't attempt to comfort them. Even if you cannot close in the stock-box properly, it does not matter. Leave it open at top, if that must be, until nightfall, and then close it. Our plan with all slide and bar hives is to draw out two slides in the first instance from every box, and then we have done with slides for ever, except, perhaps, that we may some day have to lift out a bar with brood comb attached to it. To close the top, when necessary, we slide over it a spare floor-board, and there is an end of the matter.

The wintering of bees consists here in simply letting them alone, except under very peculiar circumstances. We have resorted to feeding only once in ten years past, and that was with a weak swarm that came off late in 1869, and was found to be very light when the apiary was removed in October. Then a liberal allowance of honey was administered by putting over it a full super —a reversal of the business described above.

The safest rules that can be given for winter management are to exclude from the hives the rays of the sun, and to keep them at an equable low temperature. Damp at this season is most destructive, and so is a confined air. The hives should never be closed up in winter to such an extent as to prevent a free circulation of air about them, but shelter from rain and wind is desirable. Nor should they be shifted from their original quarters. They should not at any season be disturbed, but in winter quiet is more than ever necessary.

February is the beginning of the bees' year. But they begin the year with no flourish of trumpets or tidings of gladness, for at this season they are usually weak, and young bees are coming forward in the combs, so that their labours are heavy while food is scarce. If feeding appears to be necessary, defer it as long as it seems safe to do so; and then give food sparingly inside the top of the hive. A simple mode of feeding in spring is to insert small sticks of barley-sugar in the mouth of the hive. This method is admirable for beginners, who might be awkward in feeding from the top of the hive. If the barley-sugar is without flavouring of any kind, the bees will prefer it.

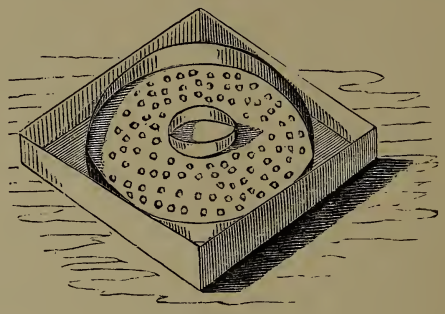
When once the bees shew signs of real activity in spring, remove any screens that may have been used to keep the winter sunshine and rain from reaching them, and encourage the warmth of the hive by the admission to it of sunshine. Now will be found the benefit of strong stocks, which bring their brood forward long before there are any signs of life in scantily-populated hives, in consequence of the greater warmth of numbers. Spring flowers in the immediate neighbourhood of the hives are very serviceable, for the bees are now weak, and incapable of long flights; the weather, too, is trying, and if pasture is close at hand, it is a great benefit to them. They soon get strong, however, and disdain the scattered honey-bells of the garden.

Before the stocks are made up for the winter, it is necessary to be sure that they have sufficient food. Twenty pounds of honey will be required, and comb, hive, and honey ought to weigh at least thirty pounds, or the bees will suffer from want of food before they begin honey-collecting in the spring.

They had better have too much than too little, for they waste nothing, and repay you in the spring for the liberality you shew them in the autumn.

It is at this season of the year that calamitous accidents befall bees, not so much through their natural enemies, or alterations of weather, but through the mismanagement of bee-keepers; the great mistake, so disastrous, yet so universal, being that of removing the honey harvest late in the season. Not a particle should be removed after the last week in July.

The inexperienced amateur, to whom the loss of a stock, or perhaps the whole of the apiary in the spring, will be a sad calamity, had better take the wiser course of giving the bees too much, and after having gathered the honey harvest, supply them liberally with food, the more especially in the neighbourhood of towns, where late-blooming honey pasture is not always within



Float Bee-feeder.

reach. In an improved hive, feeding is easily accomplished, and feeders should be purchased at the time of stocking the apiary. These are made to suit particular hives, though there are feeders which suit almost any hive or box. The principle of all feeders is, however, the same—the bees are admitted to a perforated float, underneath which the food flows to them from an adjoining reservoir. If supplied with food in a bee-feeder towards the end of autumn, they store away a large quantity in their combs, and even enlarge their combs to receive it.

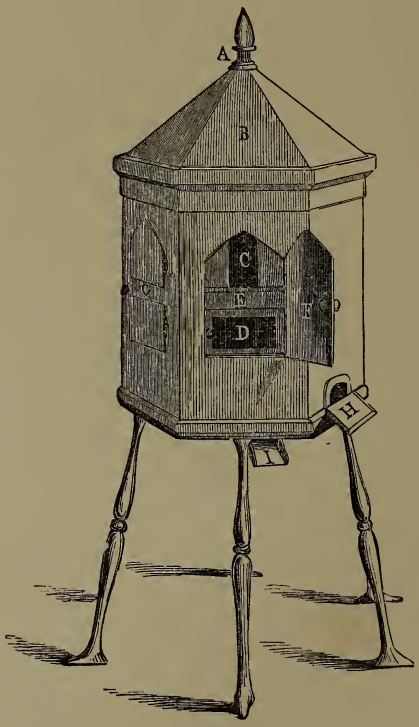
The best food for bees is honey, and in harvesting all broken combs should be saved for feeding. If honey in sufficient quantity is not an hand, take one pound of loaf sugar, a quarter of a pound of honey, and half a pint of spring water; boil up half a minute, and allow it to cool; give it to them before it

is quite cool. Another good food is barley-sugar. In giving food be quick and prompt, always waiting until after sunset ere disturbing the bees.

We have as yet said nothing on the subject of bee-stings; we have treated the subject much as if the bee were a patient, inoffensive creature, who would put up with any usage quietly, and with no desire for resentment of injury. Such certainly is not the popular opinion as to bees, yet the fear of being stung is the last thought which enters into the mind of the experienced apiarian, except in autumn, when it does sometimes happen that the taking of the harvest puts them out of temper. The fact is, confidence is the best protection; if bees are handled skilfully, there is nothing to fear. Those who love bees will be loved by them in return, and mutual confidence will banish fear on one side and ill temper on the other. To beget this natural confidence, the

bee-keeper should take daily interest in them, not in vain meddling, but in quiet observation, and the bees will soon show that they respect a benefactor. But as every one must have a beginning, and many may begin timidly, the apiarian armour will be found useful. It is made of a light net, called leno, and passes over the head and face, and fastens round the waist. The cost of the complete garment is only five shillings. The hands should be protected with thick woollen gloves, from which the bees may easily withdraw their stings. If leather gloves are used the bees cannot withdraw, and are lost in consequence. The loss of the sting is certain death to a bee. Great care should be exercised not to kill a single bee in any operation, for not only do you lose a good servant and friend thereby, but the smell of a dead companion exasperates the whole hive, and an attack is never to be desired.

In hot weather, a thoroughly earnest sting is followed with much pain and swelling unless promptly dealt with. First draw the sting from the flesh, and then press a watch-key hard on the place, to prevent the spreading of the poison. Then bathe with a mixture of hartshorn and water, or any mild ammoniacal mixture, such as water and *sal volatile*. The cottage prescription is blue bag, which probably owes its efficacy to its alkaline properties.



ENCLOSED CORK HIVE FOR THE LAWN.

A, B, loose cover; C, supers; D, G, windows; E, top of hive; F, door in outer case; H, entrance; I, place for removal of dead bees. The object of enclosing the hive in a large loose cover is to preserve an equable temperature, and defend the bees against damp.

THE PLEASURE GARDEN

The gaudy peacock boasts not in his train
So many lights and shadows, nor the rain
Heaven-painted bow, when that the sun doth court her;
Nor purple pheasant, while his mate doth sport her,
To hear him crow, and with a beauteous pride
Wave his discoloured neck and purple side.
I have not seen the place could more surprise,
More beautiful in nature's varied dyes.
Lo! the blue bind-weed doth itself unfold
With honeysuckle, and both these entwine
Themselves with briony and jessamine,
To cast a kind and odoriferous shade.

BEN JONSON.

IT is time we found our way into the garden, for there we shall find enough of pleasant work to do. No one will expect in these pages a systematic treatise on horticulture, or on any one of its many branches; yet we must have a chapter on the pleasure garden, if only to serve as a preface to the essays that will follow on certain of its features, which more especially come within the scope of this work. We shall be as fragmentary and discursive as possible, if only to keep the reader constantly conscious that this is not a treatise in any sense of the word. It would not be fair to say that a Home of Taste cannot be created except in the vicinity of a garden, nevertheless it is certain that a garden is a very essential portion of such a home. It has always been so, for at the birthday of the world "the

Lord God planted a garden eastward in Eden; and there he put the man whom he had formed," "and the Lord God took the man, and put him into the garden of Eden, *to dress it and to keep it*," for until this first of men and first of gardeners received "into his nostrils the breath of life," "there was not a man to till the ground." So far then from the tilling of the ground being a special part of the curse of the fall, it was from the first an occupation sanctioned by divine command, and though man's highest duty was to love and worship the Father of all things, he was, nevertheless, made to till the ground, created *ab initio* a gardener. Nor did the Almighty spare his mercy, when the fall brought on "the man" a merited punishment. The joy of gardening was still vouchsafed to him, and the eternal penance of himself and his race was to be tempered by a consideration of the lilies "*how they grow;*" for when he went "forth from the garden of Eden," his first sweet task was renewed to him, "to till the ground from whence he was taken."

Through every succeeding period of human history the culture of plants has taken prominence among the sober occupations as well as among the amusements of mankind, and this "iron age" finds a strong contrast to its harsh commercial tendencies in the increasing love of flowers and the expansion of taste in their arrangement and cultivation. Gardening is now one of the completest of the arts, for it is an art as well as a pursuit, subject to rules as definite as those which control its sister arts of painting, sculpture, and poetry; and to which indeed it furnishes innumerable materials, and acts at once as nurse, teacher, and standard of comparison.

It is beyond possibility in one short essay to convey anything like a full expression of distinct opinions on the principles of taste in gardening, for the subject ranges, wide and far, over a variety of associated topics. But a few suggestions may be useful, and as we cannot ignore the subject, it must be treated with a view to usefulness. And the first thing that occurs to us is the fact, that as very few persons, especially in suburban districts, build their own houses and plan their own grounds, so it is often impossible to realize distinct ideas of gardening taste. We cannot have any great varieties of surface when we take up our residence on a flat plain, nor can we command a slope to the south where the house is already built on a slope to the north. But where the choice can be made, it is undoubtedly of the first importance that a garden should slope to the south, that its surface should be diversified, that it should admit of some kinds of water scenery, and be surrounded either with fine open country or picturesque woods, or with some objects, natural or artificial, on which the

eye may rest with pleasure when the walks themselves are exhausted, and we have arrived at the boundary of the domain.

Then as to the laying out, every person who really loves a garden has some idea of the plan and style that will be most pleasing to himself, and a predetermined opinion as to the extent of space to be devoted to the several departments of wood and water, roads, and lawns, flower-borders, shrubs, and the culture of edibles. The nature of the ground itself must always be first considered in relation to such matters, but whatever the arrangement, every thing must conform to certain principles of taste, or the most sincere efforts will be wasted.

Two important matters should be kept in view from the first. We must endeavour to develope the natural features of the place, and we must subordinate every detail to the production of a *complete effect*. Every contrast should help to conserve and strengthen the harmony of the whole, the details should mutually assist each other in creating a succession of pleasing cares, anxieties, and occupations, and a varied scene of ever-changing delight. It should be borne in mind by every cultivator of taste in gardening, that a garden is an *artificial* contrivance, it is not a piece scooped out of a wood, but in some sense a continuation of the house. Since it is a creation of art, not a patch of wild nature, so it should everywhere show the evidence of artistic taste in every one of its gradations, from the vase on the terrace to the "lover's" walk in the distant shrubbery. True nature is not to be shut out of the scene, but nature is to be robed, dressed, and beautified, and made to conform to our own ideas of form and colour; and while we delight in some amount of picturesqueness, we are to consider art rather than nature as the basis of every arrangement.

There can be no doubt that, climate and circumstances considered, the Romans hit upon the true theory of gardening. Their pleasances combined all the graces of the modern terrace, the display of architectural and sculptural beauty, the freshness of well-kept lawns divided by clean paths, with the old geometric evergreens and the fanciful arbours that delight us in pictures and descriptions of old English gardens. To the formal scene they added the umbrageous coolness of quaint grottoes and retired nooks, each in its place; the rustic scene removed from the immediate vicinity of the house, and approached through groves of myrtle, laurel, and cypress, all reduced to order by the skill of the gardener. The interior of the house itself formed the first portion of the garden. Here was an open space surrounded by walks, and

enclosing a grassy plot with a fountain in the centre. This was the *viridarium*, sometimes ornamented with the myrtle and the plane, and always with the ancestral laurel, a tree sacred to many an old divinity, and which is still a household god with us degenerate Britons. The inner court, or *cavæ dium*, was indeed a sheltered garden, and formed a distinct portion of the house; and even the *atrium*, which was next the entrance, had its rows of pillars, its fountain, its plots of grass, and vases of flowers, all placed within the daily gaze of the inmates, as essential portions of the domestic furniture. Then the *tablinum* and other choice rooms opened upon the *peristyle*, or colonnade, and this was the true Pleasure Garden of the affluent Roman citizen. Sometimes the *peristyliæ* were of vast extent, with superb fountains, vases, and statuary, and gloomy groves of evergreens; and frequently a forest of umbrageous leafiness, in which singing birds found happy homes amid the shadows which gave coolness to the retreat. Nor were flowers wanting to perfect the artistic arrangement, spite of the sneers that modern writers have heaped upon the old patricians for their love of fruits and other eatables, as elements of a well-planned ground. Aristophanes frequently alludes to the floral glories of Attica; and every classic poet, not forgetting even Juvenal, has in some way or other celebrated the *elegance* of the gardens in and about the imperial city. Virgil describes the old Corycian as rejoicing in his "white lilies," his "roses in spring," as well as his "apples in the fall;" and did he "not so near his labours end," he says he would sing, not only of the cucumber and parsley, but of "*flowery gardens*," and of the roses of Pœstum, as well as of the narciss, green myrtles, and the trailing ivy.

> "Quôque modo potis gauderent intyba rivis,
> Et virides apio ripæ, tortusque per herbam
> Cresceret in ventrem, cucumis: nec sera comantem
> Narcissum, aut flexi tacuissem vimen acanthi,
> Pallentesque hederas, et amantes littora myrtos."
>
> FOURTH GEORGIC, v. 120.

So far indeed from the gardens of the ancients being composed only of "potherbs and sepulchral cypress," the legends that remain of Semiramis and Adonis, Alcinous and Laertes; and the historical instances of the gardens of the academies, the villas, and gardens of Cicero, Pliny, Sallust, and Mæcenas; and the splendid grounds of Lucullus on the Pincian Hill, overlooking the field of Mars and the Flaminian Way, sufficiently attest that a taste for horticul-

ENTRANCE COURT WITH SPRING FLOWERS.

tural embellishments is by no means of modern origin—nay, did not the Romans, cooped up two millions strong in a space of less than fourteen thousand yards circumference, revenge themselves on the *city*, by placing the *country* above it; that is, did they not build indestructible roofs of larch, and beech, and pumice stones, in order to lay down mould for the growth of fruit-trees, myrtles, laurels, arbutuses, oleanders, and roses? So they not only had their gardens on the house tops, but frequently miniature forests there also, in which wild birds found nesting quarters, and tame birds in cages were hung about to attract the savage songsters by their madrigals.

Indeed Horace makes it a special subject of complaint, that in his time the ornamental gardens were fast usurping the place of the old olive and apple grounds, and that the demands of luxuriance were fast destroying the profitable groves and orchards; proof enough that a cabbage or bulb of garlic was not the *ne plus ultra* of a Roman garden.

"Jam pauca aratro jugera regiæ
Moles relinquent; undique latiùs
Extenta visentur Lucrino
Stagna lacu; platanusque cœlebs
Evincet ulmos: tum violaria, et
Myrtus, et omnis copia narium,
Spargent olivetis odorem,
Fertilibus domino priori."

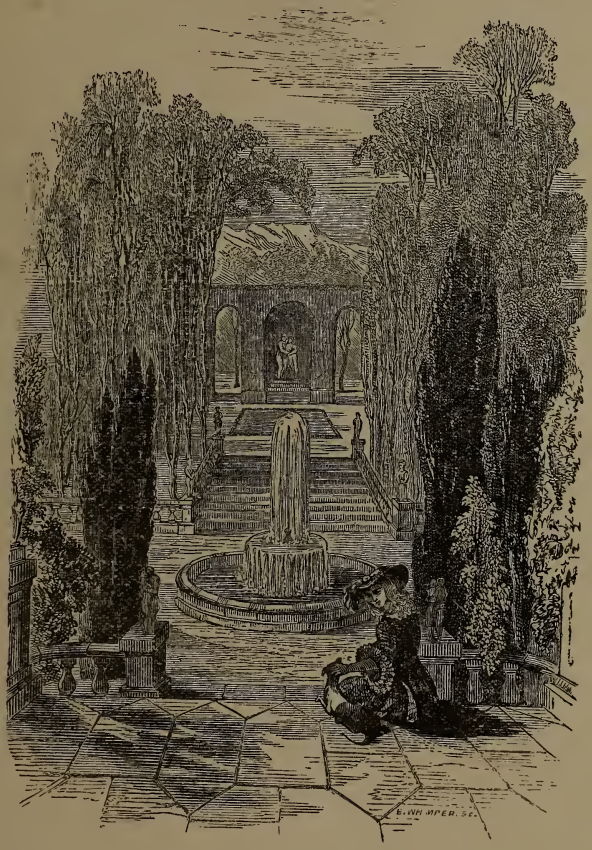
Lib. II., Ode 15.

Though these roof gardens might be worthy of revival at the present day, in London and other great towns, it concerns us most here to get back quickly to the garden proper, and renew the thread thus broken, in an attempt to set forth something like a code of taste in gardening.

This discursion is entitled to indulgence, because, after all the styles and schools of gardening have been considered, that which prevails at last is based upon the Roman plan. Our modern terraces, vases, sculptures, fountains, glowing parterres, refreshing lawns, and bright gravel walks, formal and artistic, near the house and verging by degrees towards the scenery of the surrounding country, are the several features of a Roman garden, which was always regarded as a work of art, and now as a work of art retains its place, after the schemes of many Browns, and Langleys, and Kents, and Le Nôtres, and Watelets have been either modified to render them less distinctive examples of these several authors, or wholly condemned as pervertive of good taste, and

TERRACE GARDEN.

obnoxious to the mind that has come to regard a garden as a choice appendage to a house, rather than as a toy-shop, a gingerbread stall, or a receptacle for



Paved Court, Italian Style.

mole-hills and wayside rubbish. If the *old* Italian, and French, and Dutch, and English gardens had their several good features, the *modern* English garden admits of the combination of them all, without it being necessary to jumble

them together, or to crowd into a small space a number of incongruous elements.

How then should a garden be planned? It should first of all be laid out so that every diversity of surface may be turned to good account to increase its beauty. Near the house the artificial tone should be highly cultivated, for here at least the garden is but an amplification of the house itself. Along the southern and west sides of the building, if the garden be on that side, construct a terrace half as wide as the house is high. Let this terrace be truly Italian, with balustrades, vases, and statuary, with climbing plants of the richest character to scale its most salient angles. From this terrace a flight of stone steps should lead down to another terrace, of double the width of the first, and this lower terrace should be laid out as an elaborate flower garden, on a ground of turf, with stone fountains, statues, and vases. Here, in the summer, your gaudy parrots will chuckle on their poles, your fountains will splash and sparkle in the sun, above glowing parterres of flowers and clumps of the choicest shrubs, and a monster vase or two, loaded with flowers, will set off the angles and help to define the outlines of the plan.

From this lower terrace the walks must lead off over lawns sprinkled with evergreens, flower-beds, avenues of deciduous trees, for which hornbeam, lime, or horse chesnut, would be best. Converge the walks so that every slope forms a separate scene complete in itself, when so contemplated, and yet forming but a part of the whole. From the drawing and dining-rooms glass passages afford means of communication with the conservatory, greenhouses, bird and bee-houses: and from one side of the grounds the whole of these houses are visible, and form a noble addition to your home of taste.

At every opening point in the shrubberies you will place some object to arrest the eye—a statue, a pile of rock, a fine acacia, an orange or sweet bay in a tub, a trained pyrus or weeping ash, to form a distinct object on the sward or on a border beyond the path; in some places where you would have a shady passage leading to a view of the open country, you will plant an avenue, perhaps a quincunx, and the path here will be of mossy sward closely shaven, instead of gravel. Where this moss-walk opens again on the outer path you will place your rosary, arching the paths with trellises, breaking the sward into sample patterns of dwarf roses, in masses of separate colours, and bounding the whole with a space of turf, dotted with the finest standards. Beyond the rosary across the lawn is a sweeping background of holly or rhododendron, or at least of two sorts of shrubs only, and these are broken here and there to

open views of other portions of the garden. From this point the ground rises, with lawn on the left hand, and on the right a continuous bank, studded with wild thyme, strawberries, masses of roses, honeysuckle, and here and there grand pyramidal avenues of hollyhocks. As the path ascends we come into view of a dense shrubbery, before or amidst which here and there arise the tall outlines

of some majestic firs, or the red cedar, the cyprus, the arbor vitæ, the white poplar, or the hemlock spruce. When the summit has been gained, the scene that opens is entirely new.

Below on the left lies the sloping sward, dotted with roses, tree peonies, and hollyhocks, and backed by the rich and dark borders of shrubs; above on the right is the bank covered with roses and trailing cystuses, and broken here

and there by immense clumps or knolls of ivy; and this bank extends round in front of us, so as to cross the path and lead the way to a rustic summer-house perched on a hillock, the front slope of which towards the lawn is planted with ferns and alpines, and dips into a mimic lake, not fashioned so as to deceive us as to its size, but with a simple and definite boundary margined with aquatic plants, and the water enlivened with a few water-fowl.

If you found places on your terraces and near the windows of the house for flowers, in elaborate patterns of mosaic; for vases, statuary, fountains, sculptures, here is the proper place for such rustic work as you may care to indulge in. You may embellish the lawns with bark baskets of flowers, tree-stumps filled with flowers and ferns, masses of rock covered with ivy and wild creepers, with, in suitable spots, a rustic seat, a table, a summer-house, or a thatched bee-shed, each object being so placed as to form the key to a separate scene, and to have a visible use to sanction its adoption. Wherever your walks wind they should lead to something or somewhere; they should not wind merely to form ovals and parabolas, but to disclose a scene, a view, an object, or a group of objects. Where something which you cannot remove requires to be hidden, throw over the path an archway, build a knoll and cover it with ivy, construct a bower, plant a group of shrubs or trees, but let every detail form only a part of the whole, however each may be to a certain extent complete in itself. Here is a resting-place umbrageous with branches on one side, open on the other to your own grounds, and if you have a view of a neighbouring church, a distant hill, a coppice, a wood, or a sheep-walk, let some good point be selected for observing it, so that you can either revel in the glory of the sunrise with a grand natural panorama before you, or retire to your summer-house to read

> Many an old philosophy
> On Argive heights divinely sung.

From this nook of coolness and verdure narrow walks may lead back in another direction to your American garden, through other lawns covered with fruit, where visitors may pluck and eat as they please, nor barred out by a tantalizing gate, or prevented from approach by a five-feet fence of thorn. Then your kitchen-garden, which you enter through a screen of filberts and raspberries, brings you once more towards the house, and you have only to cross the few borders of shrubs that intervene between the lawns and vegetable ground to reach again the Italian garden, where the fountains once more delight you

with their musical splashing, the flower-beds load the air with fragrance; and the sinking sun gilding the soft edges of the masonry warns you that the dews are increasing, and the lights are ready in the drawing-room, you take a farewell glance at a scene of which you cannot tire, and join the family circle in the best of tempers for coffee, gossip, books, or romps with the children.

In close covert by some brook,
Where no profaner eye may look,
Hide me from day's garish eye,
While the bee with honeyed thigh,
That at her flowery work doth sing,
And the waters murmuring,
With such concert as they keep,
Entice the dewy-feather'd sleep.—MILTON.

But it may not be in the power of every reader of this work to plan a garden on such a scale. Nevertheless, the *idea* of such an arrangement may

When the sun of life more feebly shines,
Becoming thoughts, I trust, of solemn gloom
Or of high gladness you shall hither bring:
And these perennial bowers and murmuring pines
Be gracious as the music and the bloom
And all the mighty ravishment of spring.—WORDSWORTH.

be carried out in a small plot; and no matter what the size, shape, or position of a garden, the leading principles of taste in gardening must be kept in view at every step to insure success in the end. A notable example of what may be done in a narrow space to realize a lovely scene, and how that scene may be marred by one simple oversight, occurs to us as we write. It is that of a handsome villa, with a small entrance court and very limited space of garden ground behind. The villa has a handsome portico entrance and a passage through the house; the rooms are arranged on either side of this passage, and of course there are windows on each side of the portico. The house itself is a pattern of chastity; the windows bright, the blinds elegant, the window-sills filled with flowers, the entrance court planted with grass and shrubs. Looking through, the eye catches a beautifully-stained glass fan-light, which surmounts a door of enamelled glass, opening into a conservatory. The conservatory is well stocked, and as well arranged; it is a garden in itself. Another glass door, opening at the side of the conservatory door, conducts us into a small garden, fenced with a well-trimmed hedge of yew, and laid out in parterres of shrubs and flowers, with a small patch of turf in the centre, embellished with a pair of vases. Everything is so bright and cheerful, and complete within, that on emerging at the gate we take one last look at the scene through the open door in the portico, and then we find the whole spoilt by a pair of rustic baskets, placed opposite the windows in the entrance court, one on each side of the approach from the highroad to the house. Contrasted against the stone facings, the trim windows, the stained glass at the further end of the passage, and with the highly-polished *tout ensemble* of this neat country box, those abominable rustic baskets seem fit only to be burnt. A pair of vases would have made the scene complete, but these rustic things are just where they ought not to be, and they spoil all the rest.

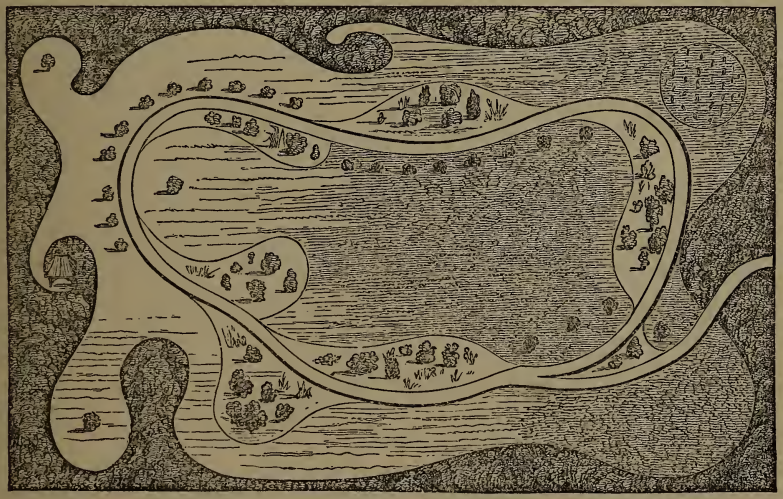
Every garden should be symmetrically arranged; the paths should never diverge at sharp angles, a large proportion should be devoted to grass and shrubs, and the chief display of flowers should be not only near the house, but immediately within view of the windows of the chief dwelling-rooms. Macintosh, in his "Practical Gardener," says, "In all cases, unless in small villas or cottage residences, the flower garden should be entirely concealed from the windows of the house, and be placed, if circumstances will admit of it, in the shrubbery." He would, in fact, light his candle to place it under a bushel; create a beautiful object and hide it, or at least place it where it could be seen only on high days and holidays, instead of placing it where it should

hourly afford gratification. Even where the garden slopes away to a splendid prospect of open country, flowers should embellish the foreground, not to draw the eye from natural scenes, but to combine happily the efforts of art and nature in the production of a living picture.

Peurile conceits are evidences of a poor mind and a love of paltry trifles; attempts at *the picturesque* are mostly puerile; as far as the eye can range, from terrace or window, all should be artistic, and every separate feature subordinate to the whole. No rock-work should deface the slopes except *artificial* piles, constructed to receive groups of plants, such as verbenas, lobelias, gentianella, specimen ferns, and rock roses. Meaningless curves winding upon themselves, like eels in misery, are as tormenting as they are tortuous; wherever the paths turn aside it should be to show something. Water should be seen in plenty in the midst of flowers, and grass, and sculptures, not in green stagnant pools, but in basins of stone, bright, moving, and wholesome to look upon. There should be no wilderness of a shrubbery to entangle the eye from a distance, or the head when near, but belts of holly, arbutus, and rhododendron, groups of ornamental pines, with araucarias, deodoras, and larches, sprinkled about in masses, opening at intervals to other walks and scenes, so increasing the apparent extent of the ground, not by a trick, such as Evelyn would have delighted in, of painted canvass and imitative perspective, but by the judicious mingling of open grassy spaces, parterres, masses of shrub, beyond which should tower lofty elms, chesnuts, poplars, and limes, so as to give richness as well as variety to the scene. Every advance from this point should prepare the eye for a gradual change from the highly-artificial to the semi-natural. When this is well done, the mind obtains a sense of rest and satisfaction, and rejoices in the escape provided from the exciting effects of highly-coloured formal scenes. Great floral displays are admirable in public gardens, but scarcely to be desired in such as are kept for the daily enjoyment of the members of one household: then, indeed, a croquet lawn and a grove of nut trees will probably be held in higher estimation than the most sumptuous dressing of the geometric garden.

There is more thought and said about styles than can be justified by facts or sound principles of taste. Styles differ, and a master of landscape will give a certain oneness of expression to a place that an inexperienced hand could never do. Yet there is not much room for choice of style when we are about to lay out a garden, although within certain limits, of which, indeed, we have no choice either to widen or contract them, there is room for almost endless

diversity. The general plan of a garden must, to succeed, be adapted to the configuration of the site, the nature of the soil and the climate, and the peculiar tastes and means of the proprietor. It may seem to be superfluous wisdom to lay down the fundamentals of the case thus simply, yet that is the true way to deal with the subject broadly. Almost in every case now, we find the English style prevail, because of the variety it affords, because also of its naturalness, for few people can abide the restraints of hard lines and severe symmetry of design in a garden, and because also of its adaptability to our



Design for Pleasure Garden, English Style.

climate. It allows sufficient of the formal for display, but engrafts upon it a natural expression, or, as we may say, supplants the coldness and harshness of the strictly artificial with the warmth and ease that characterize a genuine welcome.

A few practical suggestions may here be offered to close this roundabout chapter. It is of the first importance, to make the very best of the circumstances that characterize the situation. It is easy to talk of raising mounds and digging hollows on flat lands, but, to say nothing of the cost of such works, it is generally better to make the best of a flat surface as it is, than

to risk making it hideous with misplaced hills and hollows, obnoxiously artificial and obviously intended to deceive. One of the most beautiful small gardens in England is that of the episcopal palace at Fulham, which good Bishop Compton planted two centuries ago, with a taste rarely equalled at that time. This garden is as flat as a dining-table, and owes its beauty and interest wholly to skilful planting, and the number and size and beauty of the trees. The gardens of the Royal Botanic Society, Regent's Park, afford a most interesting example of the judicious treatment of a small space, where a certain amount of show (and we may say of pretence,) must be made, because of the public uses of the place. It contains lakes, shrubberies, conservatories, hills, valleys, promenades, all comprised in a space so limited that they are of necessity mere miniatures, yet so well proportioned and so evenly balanced, that the thousands who there assemble in the season to witness the horticultural exhibitions, experience no sense of imprisonment or deficiency of breadth, such as would doubtless be felt if the whole affair were spoiled by the formation in its midst of a great and grand geometric garden. The designer knew where to stop, and so hence we may scarcely find a score of flower beds in all the place.

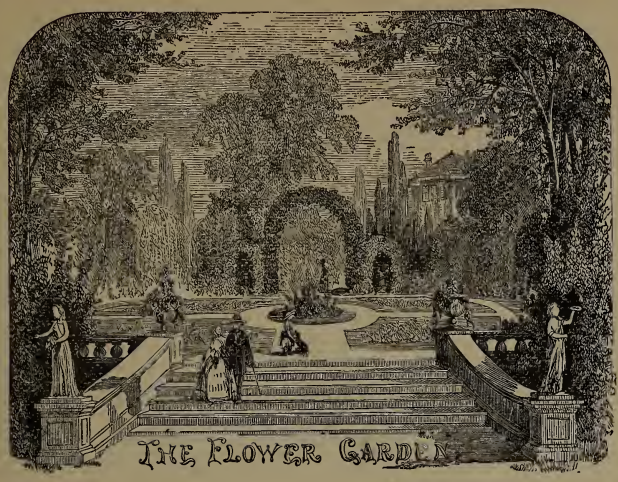
The advice on making the best of the natural features of a place, may be followed by another to this effect—that it is wise to avoid difficulties, and foolish to court them. We see money wasted on doing things badly, a fraction of which might be expended on doing something else in perfection. Of course peculiar tastes must have peculiar gratification, but it is a golden rule to take lessons from nature, and engraft our ideas upon the facts around us. In some places water is a prominent feature, and there the prudent artist will make the water minister to his pleasure. In other places water scenes would entail for their production enormous outlays, with the risk of unsatisfactory results. In such cases the prudent man will be content to make the best of his sandy uplands or dry chalky downs, or whatever else he may have cast his anchor on.

A few distinct features are much to be desired in every garden, and the more truly they harmonize with the general plan, and suit the capabilities of the place the better. The natural products of the spot will generally give the key to its capabilities. Where the oak and the elm thrive, almost every kind of large-growing deciduous tree may be planted with safety. In a chalk country American plants are not to be thought of except by the affluent and the wasteful, and such also as enjoy paying dearly to have a first rate chance for a failure. Coniferous trees are peculiar in their

requirements, and as we must wait to learn how far the soil suits them, it is desirable to exercise great caution before planting them to any extent on land that has never been put to the test before. Many a noble property has been injured almost beyond reparation by the formation of extensive "pineries" on land unfit for the support of pines of any kind. What a blessing it is that grass will grow anywhere, and that trees and shrubs may be found for any kind of soil or climate where a sane man would be likely to make a garden!

There remains yet one more subject for general observation. Good effects may be produced by means of the simplest materials, yet a certain number of interesting objects and attractive spots are to be desired in every garden which is to constitute part of the daily food of an intellectual being. A few noble trees, well placed both as to their requirements and the display of their characters, afford delights that never weary, for the trees indeed become so like parts of ourselves that we take them with us into all our outdoor pleasures, and into many of our fireside thoughts. Nor are trees the only things suitable to afford character and interest. A place may be exquisitely beautiful in its general plan and furnishing, yet never take firm hold of an earnest nature because of its lack of domestic interest. The grandest act-drop ever painted was not much cared for by those who came to see the play. The moving story told on the stage when the act-drop was out of sight was the real attraction, not the glimpse of a terrestrial paradise which that unchangeable painting revealed in such rosy colours. Some gardens are like act-drops, faultless in plan, elaborate in detail, and perfect in finish: but they afford no lasting interest to balance the first surprise; they cloy without satisfying, and actually trouble us all the more because we know not how to find fault. But how the case would be changed if in our first experience of wearisomeness we were to discover that we had not seen all the garden yet; that away from the trim walks and smooth lawns, the brilliant flowers and the classic statuary, there were to be found quiet nooks devoted to ferns and alpine plants; to collections of ivies, with perhaps a bit of grey ruin on which the more striking varieties were displayed. Here, to be sure, we enter upon a large subject, and must take care we are not carried away. But the necessity for interesting objects and attractive spots needs not to be elaborately vindicated. Tastes vary so much that one who could delight in forming a grand American garden, or a great rockery, would scarcely care to grow mosses and ferns in a damp dell, or rear golden pheasants in an aviary. It is quite fortunate that we cannot consult

all tastes, because for that very reason we are left free to remark that catholicity of taste is nothing less than the subjection of the fancy to the laws of common sense. We may not be able or willing to engage in a variety of amusements, but it is good to believe that things which interest us not are quite as worthy of somebody's attention as our own special pursuits, which we profess are very precious to us. A garden may contain so much or so little in the same space and at the same cost, that the wise man will consider from the first how to arrange it so that it shall afford a variety of entertainments to minds of different bent, without being overdone anywhere, and without any sacrifice of those necessary features which render it a visible expansion of the house he lives in. He, indeed, may care little for noble trees or for alpine flowers, but he will not need to enquire much or travel far to discover those who do; and a garden should please many to justify the appropriation of the land for the purpose.



Along these blushing borders, bright with dew,
And in yon mingled wilderness of flowers,
Fair-handed spring unbosoms every grace.
* * * * * *
Infinite numbers, delicacies, smells,
With hues on hues expression cannot paint,
The breath of nature and her endless bloom.

THOMSON.

THE Flower Garden frequently obtains so much attention as to lose thereby many of the attractions which properly belong to it, as a source of entertainment for all seasons and a perpetual delight for the mind as much as for the eye. It would be treason to our purpose to say a word which might tend to lessen the enthusiasm of the lover of flowers, for are we not seeking by these lines to multiply and brighten the tasteful surroundings of rural English homes? But we must preface this chapter by the remark that, regarding the subject broadly, and with a view to many interests, fashion has robbed the English flower garden of many of its best features, and deluded us into a passion for tinsel display, to the detriment of the higher tastes the parterre should gratify. If we do not explain our meaning in full before we close this essay, we will in the last word recant, apologize, and acknowledge that, through our own temerity, we are quite undone.

The Flower Garden. How shall we define it, when at the moment of completing the definition we may chance to catch a glimpse of a great sheet of scarlet poppies that haunt a field hard by where we write, and that appear

to have sprung up there to taunt us with a sense of our shortcomings in the sorting of our geraniums, and the colouring of our long ribbons and sloping banks. Well, as we must begin somewhere, we will venture on a platitude, that a flower garden should be adapted in extent, and design, and furnishing, in everything, to the house and the garden it is intended to embellish. Yet this common-placeism is of some value, for it is not everywhere observed, and therein we find the lines of our first quarrel with the fashion. A great and much elaborated flower garden, gorgeously dressed during June, July, and August, and either poor or utterly empty during the remaining nine months of the year, in a garden where the grass is contracted and the trees are few and poor, is from our point of view a monstrosity, and its only proper duty is to plague the proprietor with reproaches for his want of taste.

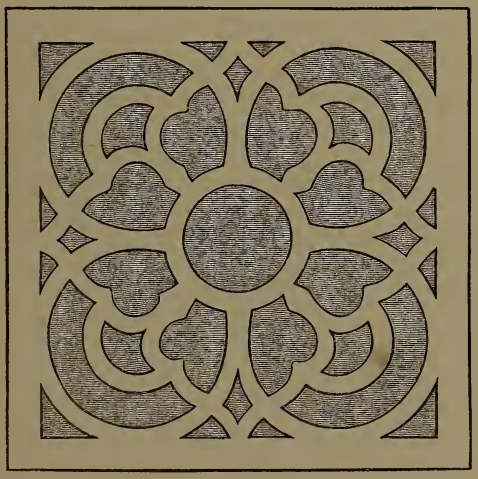
Now what should a flower garden be? It should be the last touch of the artist when the whole scheme is finished; as the bit of jewelry that is put on when cloth, silk, and fur are duly proportioned in a costume; as the brilliant epergne that is put on the table when a good substantial dinner has surely been prepared; as the ornamental feather in the bonnet that is meant for protection; as the star that shines brightly because of the breadth and clearness of the firmament; as the bloom of a tree that is never seen until there first be a tree; just as a flower garden ought not to be seen until there is a garden in the fullest sense of the word, which it may beautify and enliven by a glorious blotch of colour, or a broad assemblage of interesting objects characterized chiefly by many tones of greenness.

The flower garden "of the period" is ephemeral in its beauty, and too often embodies only one of the ten thousand ideas that nature floods us with in field, and grove, and glen, if only we have eyes to see and minds to understand. So many beds and so many colours, the whole comprised in a group geometrically, is the principal desideratum of the victim of modern fashion. The result is enlarged editions of kaleidescopic views; the colours may be harmonized to perfection, but they just lack the one thing needful, that there is no wear and tear in them; they are as the meteor that flashes past in the heavens,

> "And ere we say, behold! how beautiful,
> 'T is gone."

The geometric garden, however, is one of the good features of a well proportioned place. It is like the carpeting of the reception room, and really

takes the place of that same carpeting out of doors; for the flower garden is then the place of greeting, and its warmth of colour gives a pleasant tone of reality to words of congratulation and welcome. To lay down a principle, we will venture to say that we want flowers everywhere in the pleasure garden, not of necessity in geometric patterns, not of necessity in masses, and not of necessity of the ephemeral sort needing nine months' nursing for three months' display. The grand garden for flowers should be near the house, and if we can look down upon it from windows and terrace walks the effect will



Design for a Geometric Garden.

be richer, and the position of the flowers themselves more happy than if placed on a level with the chief points of view. We will suppose we are in a garden of some pretensions, where spacious lawns and well-furnished shrubberies are prominent features. We shall be able to live peaceably in such a place if there are flowers of many sorts scattered about, but if there is a parterre at all, we should hope to see a good one. It need not be complicated, for the good reason that simple designs are the most effective. But it should be sufficiently spacious, and decidedly bold and *prononcé* in character. Stone

mouldings will best define it, and these will be more prominent as marking outlines, if assisted by good edgings of box or lemon thyme, the last being rarely used, though one of the finest edgings possible. It must always be remembered that there are two governing permanent colours to be confronted; the tawny hue of gravel, or whatever is used in place of gravel, as broken shale, for example, and the delicious greenness of well-kept lawns. We obtain greater command of our colours when we can isolate, however partially, the geometric scheme from these dominating elements; hence stone curbs which give neutral grey boundary lines are to be prized, and still more valuable, perhaps, would be boundary lines of a cold slate-colour; but unfortunately we have no stone of that tone, and slate cannot be moulded to curves vertically,

Design for a Geometric Garden.

though in a large scheme it may be so adapted to horizontal lines. Practically, however, we never need be paralyzed for means of forming definite boundaries, and we repeat, the more simple these are the better for the result. The general sameness of geometric designs, for they are all more or less imitations of carpet patterns, may be happily disturbed by suitable accessories, in the shape of curvelinear banks, boundary masses of dwarf juniper, clumps of roses, and ribbon lines of silvery leafage. Spread out an embroidered opera cloak, and you may perhaps find the principal ornament to be a silver star, perfect in designand finis. But observe also that the artist has carried round the edge a waving line of silver, or gold, or grey; this idea would redeem

many a grand geometric garden from the unhappy likeness it bears to a bad one in its mere repetition of semicircles, and ovals, and oblongs.

> "He who would see his flowers disposed
> Sightly and in just order, ere he gives
> The beds the trusted treasure of their seeds,
> *Forecasts the future whole;* that when the scene
> Shall break into its preconceived display,
> Each for itself, and all as with one voice
> Conspiring, may attest his bright design."
>
> COWPER.

In balancing colours, their relative degrees of light is a matter of the utmost importance. A common error is the over much employment of high tones of colour, scarlet and yellow ruling, as if the rainbow had but a couple of tints. The colours that have most light in them (pardon the unscientific expression,) should be employed to draw out the pattern; hence silvery leaves, and yellow and white flowers tell best in the outer parts of a design, the stronger tones of red and blue being placed in the inner beds, but separated there by the neutral tints of variegated-leaved geraniums and other plants of like character. Symmetry of colouring in a formal pattern is absolutely necessary, for as the outlines correspond right and left, so the colours should. It is a good plan to colour a design on paper, with water colours, and thereby judge how it will look. Having attained to a good result that way, there will not be much difficulty in finding plants to carry the scheme into effect, provided only that all possible bedding plants are at the command of the planter. In the majority of cases a geometric garden is planted according to what a man hath, and not according to what he hath not, and hence the many blunders in colouring that those who travel much and visit many gardens have long been painfully familiar with.

The popular idea of the flower garden is confined and partial, owing to the enormous unmerited popularity of a certain few tribes of plants. We can have no quarrel of a general kind with the geraniums, and calceolarias, and verbenas, for we have proved our interest in them by years of labour in improving their characters; but we do wish with all our hearts that the thousands who delight in flowery gardens would awaken to the fact that these are not the only flowers available for purposes of decoration. Within the past few years we have—heaven be thanked for the revival of a

half-extinguished light!—we have witnessed a revival of interest in the herbaceous border, and in hardy plants generally. Our wealth of subjects which need no glass or fire to keep them through the winter, and that scarcely need cultivation, is simply beyond estimation; and if we find in a garden a grand parterre, we should like also to find clumps of pæonies and lilies on the lawn in spots remote from the parterre, and in the borders noble tufts of delphiniums, pentstemons, herbaceous lobelias, and phloxes: examples of *Acanthus lusitanica*, *Iris germanica*, *Anemone japonica*, *Aster elegans*, *Hemerocallis flava*, *Viola pedata*, *Dodecatheon meadia*, *Cyclamen europœum*, *Spiræa palmata*, and a hundred, aye, or a thousand more fine hardy plants that are distinguished by nobleness of port or splendour of colouring, and that ask no more care than that they be properly planted in the first instance, and for ever afterwards be left to take care of themselves. What a glorious heritage of flowers has the Almighty offered us for our gardens, and how little is it prized by those who make loud professions of their love of flowers, and their readiness to encounter and overcome difficulties for their multiplication and keeping! A flower garden in which the hardy herbaceous and alpine plants are not fairly represented is a poor ephemeral affair, no matter how it may blaze with colour in the month of June, for the bedding plants, *par excellence*, "have their day and cease to be," a short day of joy to be followed by a long night of anxious watching; but these hardy self-protective beauties give us flowers ten months out of the twelve, and welcome us to walk out every day that the sun shines and the wind is not so keen as to make our teeth chatter.

A fine innovation on the stolid stereotype of the English flower garden is that known by the ambiguous, yet not wholly objectionable designation of the "sub-tropical" system of decoration. A great number of plants of most noble proportions, many of them gaily coloured, and when lacking colour making ample amends by the splendour of their leafage, may be made perfectly at home in our gardens during the summer, though until lately regarded as suitable only for cultivation in all seasons under glass. Perhaps the first place in this glorious company should be assigned to the *Canna*, of which there are more varieties now than any one garden can require, differing wonderfully in stature, in the colours of their leafage, and in the colours of their flowers. The more robust kinds with light green leaves emulate the musa or banana in their characters; others again afford imitations of the maranta and the dark-leaved dracænas. Their flowers vary from palest yellow to deepest orange, and from delicate pink

THE SUB-TROPICAL GARDEN.

to deepest crimson. These are just as easy to grow as dahlias, and indeed in sheltered spots on well drained soil may be left in the beds for years, if protected during winter with a mere sprinkling of dry litter, which by the way need not be unsightly, because a sprinkling of earth will hide the litter, and abolish the objectionable suggestion of a flower bed being used as a rubbish-heap, which must occur when means of protection are made prominent. Irrespective too of plants adapted for massing, such as *Erythrinas*, *Wigandias*, hybrid *Clematis*, *Caladium esculentum*, *Udheas*, *Solanums*, and *Ricinus*, the sub-tropical movement has brought into notice a number of fine plants which like the clematis and the cannas are nearly or quite hardy, and which therefore are not properly sub-tropical, though most happily associating with the more distinctive kinds of tender plants, because of their grand outlines and massive proportions. The *Yuccas*, *Agaves*, *Dasylirions*, *Beaucarneas*, many of the *Dracænas*, *Bamboos*, the *Papyrus antiquorum*, the glorious pampas grass, *Gynerium argenteum*, afford fine masses for suitable positions apart from the concerted display to mark angles in walks, to fill up interspaces, and to dot the green verges and belts of grass with their sumptuous assemblages of fine hues and unwonted *entourage* and colour. In selecting from these, a bold distinction should be made between such as are adapted for summer display only, and such as are capable of enduring "'a the airts" of our bleak winter season. For this one object principally, that plants requiring to be "matted up" in winter disfigure the garden; why indeed should our lawns and parterres be disfigured for three or four months at a time with plants that must be made up into bundles and protected with mats and canvass, when if we will but select wisely and manage well, we need have no such hideousness? Depend upon it, a garden studded with plants that must have their bed-clothes packed round them within everyday eyesight all the winter, is no tasteful garden, but a makeshift place, for it matters not how valuable the plants so protected may be, the very fact of their needing protection is a veto against their occupation. We do not need to be worried with hideous pyramids of Russian mats all the winter, just because when summer returns the mats will vanish, and classical laurels or buxam yuccas will stand unhurt where stood the miniature sheds and crates and gipsy tents before.

We live in the present, and our garden scenes should not obtrude upon attention what has been or what will be; every season should unfold its attractions without being burdened with the dregs of the season that is past, or the incipient germs of the display that is coming. When nature imposes upon us

the spectacle of something in preparation, we may patiently bear with it, but art must not go out of its path so far as to tie up bundles of dead leaves, and suspend them, like signals on a road under repair, to notify that carriages cannot now pass that way.

To plant the flower garden is something, so also is it something to ensure a well-dressed lawn. Broad, open, unbroken grassy spaces are much to be desired. But suitable frame works and isolated embellishments are not to be despised. Provided the thing is not over done, a lawn may be enriched in

the most delightful manner by dispersing over it objects of beauty and interest, and by dotting the boundary borders with plants of striking character. Rustic baskets befit rustic scenes, and should be richly furnished without any imitation therein of the symmetries of the bedding system. One of the advantages of such embellishments is that they afford opportunities for the cultivation and display of elegant plants, which do not well fit into compositions of precisely formal character. In these baskets many of the semi-scandent plants may find a place. The showy *tropæolums*, the modest

Mikania scandens, the pretty *Maurandya Barclayana*, and *Eccremocarpus scaber*, the *ivy-leaved geraniums;* with ferns, fuchsias, cupheas, and mixtures of all sorts, always allowing a good proportion of pure green, make effective pictures, the more acceptable generally if not too showy, and the more acceptable also if not too precise, but suggestive of

The negligence of nature, wide and wild.

Such trees as the *weeping Elm*, the *weeping Sophora*, the quaint *Caragana*,

the towering *Arundinaria falcata*, the tufty *Arundo conspicua*, the ghostly *Negundo variegata*, form admirable accompaniments to the boundaries of grassy spaces, and afford richness, variety, intellectual interest, and picturesqueness of the true artistic sort; for the hand of the artist should be visible in the flower garden at every point, not in a restrainful or oppressive temper, but as if to heighten the enjoyment of a gossip or a game with festive and thoughtful accessories.

Roses are the best abused of all the customary inmates of the flower garden. Yet so delighted are we all to see rose trees well weighted with their delicious flowers, that, for the sake of the roses themselves, which cannot offend, we readily forgive the error of the hand that planted them amiss. In the entrance courts to suburban villas, it is customary to see gaunt standard roses planted on the grass turf. They are ugly things in winter at the best, but as they never thrive when planted on turf, they scarcely make a better figure in summer than in winter. In great old-fashioned entrance courts almost anything is allowable from a rockery to a border of hollyhocks and roses, provided the several incongruities are good of their kind; but in a modern entrance everything gawky is out of place: the furniture should consist mainly of grass turf, evergreen shrubs, and flowers. Deciduous trees are in place almost anywhere, but in the smaller details, a front court should be rich with such things as aucubas, hollies, bays, and laurestinus, which in winter afford the warmth of welcome, and in summer heighten the beauty of deciduous trees and flowers. Rose trees do not intentionally pine in front courts, for wherever they are planted on grass turf, it will be next to a miracle if they prosper. The much prevailing system of planting standard roses in circular beds on the lawn, and filling these beds with summer flowering plants is in bad taste, for it makes prominent the inevitable ugliness of the trees, and the digging, and chopping about of their roots for the cultivation of the summer bedders, injures the roses seriously.

The lover of roses will be ready to exclaim against this sort of criticism, Well now, we must have roses and where *shall* we plant them? Beds filled with dwarf roses with a few standards peeping up amongst them are admissible almost anywhere, and if the beds are well made and devoted to roses only, they are pretty sure to thrive. It is one of the best delights of our short summer to walk in a garden where roses abound; and if there is no proper rosarium they may be dotted about the lawn, not in miserable little circular beds accommodating one standard, but in a few large clumps consisting chiefly of dwarf bushes, (if on their own roots the better,) the standards being mingled with them, and showing their noble heads above all, their ugly stems concealed by the flowery bushes that constitute the mass. A few pæonies, delphiniums, phloxes, pinks, and carnations, dotted amongst the roses in the front of the clumps, will be valued for the variety they afford, and their agreeable contrasts of colour with the roses themselves. Standard roses may be tucked in amongst evergreens with good effect, and they always show well and thrive well amongst

rhododendrons and mixtures of shrubs. It is true we plant rhododendrons in beds of peat, except in those few instances where loam suits them; but this does not constitute a veto against mingling roses with them without any fear of the roses pining in the peat. Ask a practical gardener how to do it, and if he cannot solve the problem, order his funeral feast, and make provision at once for his wife and family.

But we must suppose a proper rosarium a possibility everywhere. Do have one, and be happy in it—the cost will be as nothing to the subsequent delight. A panel garden far removed from the house and placed below the general level affords a good site for a rosarium, not only because we look down upon the flowers, but because roses are thirsty souls, and except in very wet soil thrive better below than above the ordinary level. We freely confess here that we think nothing of elaborate plans for rosaries, although we have designed and planted many such—a few large beds with grass or gravel-walks intervening will always satisfy our desires, provided the roses are well grown and there is a good variety of them. One of the most agreeable ways of filling beds of roses is to plant dwarfs and peg them down, so that in due time the ground is paved with roses, just as in the old woods we find the open glades in spring paved with primroses and violets. For the way to do it, unless the reader can divine it by horticultural prescience, we must refer to the "Rose Book." It would be no dreadful innovation on the system to plant at distant intervals in great beds of pegged-down roses noble standard tea roses, and give them every possible encouragement to make gigantic heads. How noble would *Marechal Niel*, *Gloire de Dijon*, and *Devoniensis* appear, towering up amongst great masses of pegged-down plants of *Jules Margottin*, *General Jacqueminot*, *Victor Verdier*, *Anna Alexieff*, and a hundred more of the rosy throng! How would they appear? Just like roses, and that would be enough for people who know what roses should be.

Now we come to a very important business, that of introducing a new system of garden decoration. During the past twelve years, the entrance court of the experimental garden at Stoke Newington has been decorated on the "plunging system," which is the grandest of all systems for the dressing of any part of a garden which it is desired should be always gay without a break the whole year through. We beg attention to the few words we have to say on this system, because of its peculiar value in suburban districts, and the favour it is sure to command where an enthusiastic amateur in floriculture desires his home to be like himself, as cheerful without as it is sound and

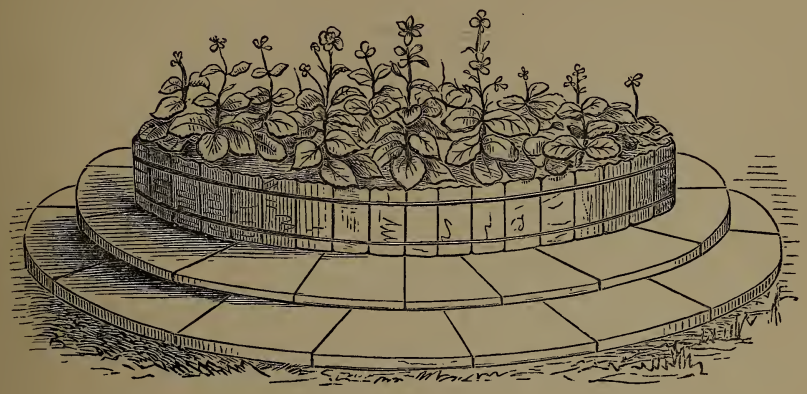
THE PLUNGING SYSTEM—WINTER FURNISHING OF JARDINET, STOKE NEWINGTON.

wholesome within. The only way in which we could vindicate this system, would be to give a *carte blanche* to everybody to come in at any time and judge for themselves, for one of the principal, and indeed necessary features of the system is, that every day throughout the year the garden so kept is sure to be richly furnished, bright with flowers, or leaves, or berries, or a mixture of many kinds of vegetation in various stages of development, say, to make short work of it, a blank is not allowable, an empty bed or border a violation of first principles, and a proof that the system has not been carried out in its integrity.

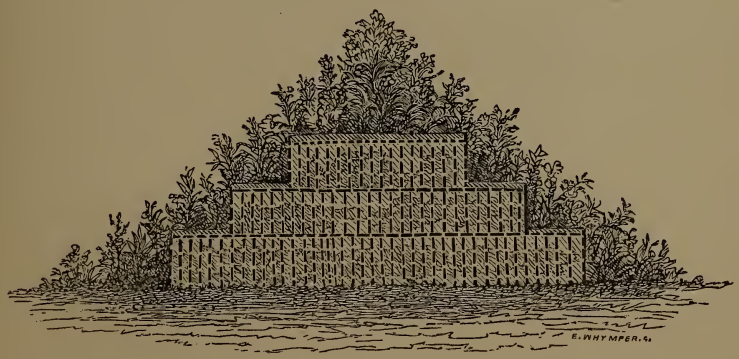
The plunging system may be explained as to its fundamental principles in a few words. The garden, or the particular portion of a garden selected for the practice, is planted with rich backgrounds of evergreen and deciduous trees. The borders and beds, which should be edged with stone, are filled with a clean pulverulent material, such as moss, tan, powdery peat, cocoa-nut-fibre refuse, or whatever else may be found best adapted for the purpose on the spot, the chief requirements being that the plunging material shall be clean to handle, retentive of moisture, without liability of becoming saturated, and agreeable in appearance. The successional displays are obtained by plunging pot plants in these beds and borders, and a regular system of pot cultivation must be carried on to provide plants for the purpose. It is costly, it demands the exercise of much skill, it will not admit of any break or makeshift, but if well done is the grandest system of out-door decoration possible. During the twelve years this system has been carried into effect in the experimental garden, every plant which made the smallest promise of usefulness in the system has been tried and reported on. The general result may be stated in a few words. The winter displays have consisted chiefly of green and variegated ivies trained in a conical form, or in the case of the fruiting kinds, as free round-headed bushes: hollies of all kinds, aucubas (bearing berries of course,) the brilliant berry-bearing evergreen thorn (*Cratægus pyracantha*,) the sweet little *Skimmia Japonica*, the golden-leaved *Euonymas*, with thiuas, firs, spruces, pines, yews, and a multitude more of hardy trees and shrubs adapted for pot culture. In early spring the fronts of the beds and borders are lighted up with snowdrops and crocuses, and when these are past a great clearance is made for myriads of hyacinths and tulips, the effect of which is dimly shadowed out in the coloured plate which illustrates this section. The summer plants include all the showy subjects known, but geraniums are the staple commodity.

THE PLUNGING SYSTEM—BORDER WITH EVERGREENS AND HYACINTHS, STOKE NEWINGTON.

As we raise a great number of these from seed every year, there are always numbers of plants of no commercial value, but very bright and beautiful,



that answer admirably for massing. Autumn gives us a fresh change of subjects, and as a matter of course chrysanthemums wind up the floral season, and then we take to evergreens again, always ensuring for the front



lines such as bear an abundance of red or yellow berries. There are times when it is no easy matter to keep the floral wheel revolving, and then we employ whatever we can find, such as hardy ferns, and odds and ends of

the greenhouses, until after a week or so there is a great batch of something distinct and glorious, ready for a place.

The plunging system demands a systematic pot culture of suitable plants, and unless that can be carried out the system must be inapplicable. For an entrance court, and for the flower beds on the upper part of a terrace, it is the *ne plus ultra;* it may be improved and enlarged, but it cannot be superseded.

Distinctive features should be sought in flower gardens, and, generally speaking, are not difficult of attainment. If there is no elaborate system of geometric beds, one or two mounds of flowers may be possible. Here are three suggestions in the shape of pictures for such distinctive features. The first is a sort of stone dais for queen flora: it explains itself. The other is formed by driving in circles of stakes, with waste slates thrust between, so as to form when the scheme is planted a noble mound of flowers. It is needless to say that in contrivances of this sort none but the showiest bedding plants should be employed, and that the affair should bear when complete the aspect of a floral trophy.

The last of the suggestions is a geranium pyramid, and we stop at that because we must stop somewhere. As this is one of the grandest of embellishments, daring, distinct, and desirable, if only as a change away from the monotony of flat colouring and imitations of Kidderminster carpets, we shall make a little essay on the subject, founded on our own practice. The accompanying sketch represents a pyramid of scarlet geraniums, which, during several seasons in succession, constituted an important feature in the experimental garden at Stoke Newington, and which was adapted in the first instance for the purpose of utilizing a number of very old gigantic plants that had been long employed for training on walls, and were at last doomed to die—or make themselves useful in another way.

To extemporize a pyramid would not be an easy matter anywhere. It must be prepared for long beforehand. The plants used to form the pyramid in this sketch were in their tenth year when first employed for this purpose; but it need not occupy ten years to get up plants of suitable size; it can be done in three years—better in five; and when once the plants have been grown to the right pattern, it is a very easy matter to keep them as many years as may be wished. The most certain and expeditious way would be to plant out in a good loamy soil, in a very sunny spot, a certain number of the most robust-growing and free-flowering geraniums, such as *Commander*, *Hibberd's Pet*, *Hibberd's Orange Nosegay*, or the old *Rigby's Queen*. They

are to be allowed to grow, and be trained upright to stakes to prevent injury in the event of storms. Suppose a dozen plants of each of these to be planted out. They would number in all forty-eight, which would suffice for a pyramid fifteen feet in diameter, and of any height to which the plants could be grown —a matter dependent, of course, upon their age. As the season advances all of them will throw up some strong shoots, and perhaps attain a height of

Geranium Pyramid at Stoke Newington.

five feet before the end of September. They must be taken up rather early, be potted in as small pots as will hold them, without cutting their roots very severely, and be at once placed in a lean-to greenhouse which has a south aspect. Eight-inch pots ought to take them, but if they can be got into six-inch pots, all the better. The pots must be well drained, and the soil must be poor loam, with plenty of grit or sifted lime-rubbish intermixed. To keep

them up, it will be a good plan to train them out against the back wall; but if this is not convenient, tie the rods loosely to tall stakes, and pass a rope along in front of them, to keep them from swaying about. The object of housing them early is to get as much as possible of the long rods well ripened. Keep them cool and dry all winter. Three or four degrees of frost will do them no harm, if they are dry, but frost and damp will kill them.

When May returns again, plant them out as before, either in a bed or against a wall. When they are planted, thin out the shoots at the bottom, and shorten all the rods to hard joints; that is to say, cut away so much of the top of all the shoots as is at all soft or swelled, or marked with brown specks, these brown specks occurring only on imperfectly-ripened wood. Do not aim at keeping them to one height, but prune them solely with a view to keep as much as possible of the hard, well-ripened wood; some will far outstrip the others in stature; let them; you will be glad in the end of a few very tall plants to fill the inner circles of the pyramid. They will again throw up fat rods from the base, and also fat shoots from the old rods. The end of it will be, that probably you will have plants full six feet high at the end of the season, allowing for the pruning away of the soft tops, which, however, should not be done till spring.

The next season the pyramid may be ventured upon; but the plants are full young yet for the work, and ought to have two years' more growing. But as the cultivator can judge for himself whether it is expedient to use them, we will suppose them to be fit; and the next business is to consider the planting. It is best to plant on the level; but it is impossible to do so until the plants are very tall and very strong, and it is seven years' work at least to have them fit for planting on the level. The alternative, in the case of young plants, is to raise the bed into a conical form, or rather into the form of an inverted basin, with a flat space in the centre, and rather steep sides. The height of the pyramid may be regulated by the height of the plants, or it may be less than the height of the tallest, because it is an easy matter to cut them down to fit. But its effect will depend very much upon its height, and it is preferable to have it a few feet higher than the measure of the extreme breadth—a cone, in fact, with a sharp point, though we call it a pyramid, in order to be more readily understood, as the word cone is rarely used in garden literature. The question of importance is, How tall can you make it with the plants you have? You may make the centre pole two feet taller than your tallest plants, because the strongest shoots can be

trained in to clothe the centre pole, and the spare two feet will be made good before the middle of July. Now, there are many ways of planting, but the best way is as follows:—Drive down in the exact centre a stout ash or larch pole, and take care to have it perfectly upright. Supposing that to be ten feet high, proceed next to put in poles of seven feet in a circle about three feet from the centre, and all leaning in upon the centre, and lashed to it with tarred rope. Thus is formed a tent of poles, with a space inside which is to remain hollow. If you were to plant geraniums there, they would perish of suffocation. But when this tent is formed, plant outside it all the tallest plants you have, causing them to slant inwards, and tying them pretty firm with good bass to the slanting poles; but in this operation room must be allowed for the wood to swell. Next, drive in another circle of slanting stakes, of five feet, at a distance of three from the last, and these directed inwards, but not all rigidly tied to the first circle, but nevertheless made firm by a few lengths of rope here and there, as the eye may direct, while the work proceeds. A circle of the next-sized plants is set round these stakes, and trained in to them. Now, by a general scrutiny, it will be found that here an extra stake is wanted, here a rod must be shortened or cut out, etc., etc., allowance being made, of course, for the growth of the plants, which will soon hide stakes and ties, and destroy the harsh rigidity of the affair, which, in truth, is rather ridiculous at first. The last job will be to plant the smallest plants in a circle, and insert stakes as needed again, slanting stakes and plants inwards. The finishing may be a ring of strong plants of some free-growing variegated geranium, but a horseshoe-leaved scarlet will be better, so as to have the bed alike throughout, from the top of the centre pole to the ground line outside. When standing on a lawn, or, as in our case, on gravel, the effect is much better when the pyramid consists of scarlet and green throughout, with an outside band of another colour.

All through the season the plants will want occasional attention, and the principal aim should be to train the growth inwards as much as possible, so as to produce a true cone as seen from all points. The knife must be used without fear to cut away any growth that threatens to spoil the contour; and as fat shoots are sure to rise from the bottom, thin away mere weedy or weak growths, to make a little room for these strong shoots, because, if they can be ripened, they make splendid rods for the next season. If the soil of the place is poor, it will be advisable to manure the plot where the plants are grown the first three or more years, and also the mound on which the pyramid

is made. In an open, sunny position, these strong-growing geraniums flower quite as profusely on manured as on unmanured ground, but with this advantage, that they make very strong shoots; and such we require for this purpose. The matter of chief importance, when manure is used, is to ensure the growth of the year being well ripened, and nothing favours that operation more than full exposure to a strong light after they are potted and placed under shelter.

A SELECTION OF BEDDING PLANTS FOR FLOWERS.

AGERATUMS.—Imperial Dwarf, Mexicanum.

CALCEOLARIAS.—Amplexicaulis, Aurea floribunda, Canariensis, Gaines's Yellow, Gibsoni, Prince of Orange, Yellow Prince of Orange, Westwoodi.

BEDDING DAHLIAS.—*Light:* Alba floribunda nana, Princess Mathilde. *Yellow:* Pluton, Golden Bedder, Golden Ball. *Scarlet:* Beauté de Massifs, Scarlet Tom Thumb, Rising Sun. *Rose and Lilac:* La Belle, Rose Gem, Blonde. *Crimson and Purple:* Tom Thumb, Crimson Gem, Royal Purple, Zelinda.

GAZANIAS.—Aurantiaca, Le Noir, Splendens.

HELITROPIUMS.—Beauty of the Boudoir, Etoile de Marseilles, La Gracieuse, Miss Nightingale, Voltaireanum nanum.

LANTANAS.—Alba lutea grandiflora, Céres, Fabiola, Jean Bart, Madame Boucharlet, Ne Plus Ultra, Madame Rœmpler, Roi des Rouges.

LOBELIAS FOR EDGING.—Beauty of Ravensbourne, Blue King, Distinction, Indigo Blue, Speciosa spectabilis, Trentham Blue, Pumila grandiflora, Pumila Model.

PANSIES.—Claribel, Maccaroni, Imperial Blue, Ware's Cloth of Gold, Magpie.

ZONATE PELARGONIUMS.—*Shades of Scarlet:* Attraction, Crystal Palace Scarlet, Lord Derby (in poor soil), Kate Anderson, Multiflora Nosegay, Morning Star, Waltham Seedling, Brilliantissima, Thomas Moore, Lucius, Rev. J. Dix. *Shades of Crimson:* Stella, Crimson Nosegay, Baron Ricasoli, The Baron. *Shades of Rose and Purple:* Lord Palmerston, Purple Nosegay, Countess of Sefton, Duchess of Sutherland, Lady Cullum, Amy Hogg. *Shades of Pink:* Christine, Magenta Christine, Queen of Denmark, Wiltshire Lass, Victoria. *Shades of Orange:* Indian Yellow, Hibberd's Orange Nosegay, Harkaway, Harry Hieover, Donald Beaton. *White:* Purity, White Tom Thumb, White-flowered Ivy-leaf, Floribunda alba nana (Groom), Virgo Marie, White Wonder. *Shades of Salmon:* H. W. Longfellow, Bel Demonio, Salmon Nosegay, Excellent, Monsieur Barre.

Petunias.—Alba Floribunda, Countess of Ellesmere, Crimson Bedder, Miss Earl, Queen Improved, Shrubland Rose, Imperial Purple, Spitfire.

Tropæolums.—Advancer, Compactum coccineum, Compactum luteum, Le Grand, Lobbianum, Luteum Improved, Mrs. Treadwell.

Verbenas.—Ariosto Improved, puce; Crimson King, brilliant scarlet; Celestial Blue, blue; Blondin, rose; Spot, pink; Purple King, purple; Le Grand Boule de Neige, white; Lord Raglan, salmon red; Laura, light rose-pink; Maonetti, rose-purple; Nemesis, crimson; Sir R. Napier, crimson scarlet; Venosa, mauve-purple, hardy.

Violas.—Cornuta, slaty blue; Cornuta Alba, white; Perfection, cobalt blue; Lutea grandiflora, golden yellow. All the violas must have a deep, rich soil, and the seed-pods must be regularly gathered, or they will not flower well throughout the summer.

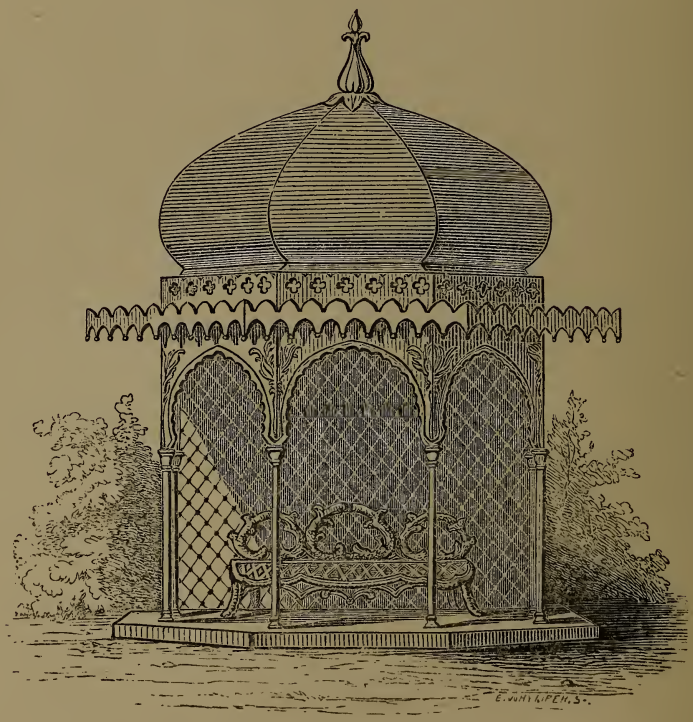
SELECTION OF BEDDING PLANTS FOR FOLIAGE.

Plants with Golden Leafage.—*Bronze Zonal Pelargoniums:* Admiration, Beauty of Oulton, Beauty of Ribblesdale, Countess of Kellie, Duke of Edinburgh, Edward George Henderson, Egyptian Queen, Mulberry Zone, Kentish Hero, Luna, Mrs. Charles Barry, Mrs. John Todd, Neatness. *Golden-leaved Pelargoniums:* Cloth of Gold, Crystal Palace Gem, Dr. Primrose, Golden Banner, Golden Chain, Crimson Banner, Golden Fleece, Jason, Little Golden Christine, Pet of the Parterre, Yellow Gem. *Gold Zonal Pelargoniums:* Mrs. Pollock, Miss Watson, Sunset, Sophia Dumaresque, Louisa Smith, Lady Cullum. *Miscellaneous:* Abutilon Thompsoni, Golden Feather Pyrethrum, Golden Balm, Fuchsia Regalis, F. Golden Fleece, Chrysanthemum Sensation, Tropæolum Ochroleucum.

Plants with Silvery Leafage.—*Variegated Geraniums:* Alma, Bijou, Daybreak, Flower of the Day, Flower of Spring, L'Elegante, May Queen, Princess Alexandra, Queen of Queens, Rosette, Snowdrop, Variegated Stella. *Miscellaneous*: Achyrocline Saundersoni, Achillea clavenna, Alyssum variegatum, A. saxatile fol. var., Antennaria tomentosa, Arabis alpina argentea, Artemesia Stelleriana, Bambusa Fortunei variegata, Centaurea argentea plumosa, C. ragusina, C. ragusina compacta, C. gymnocarpa, Cerastium tomentosum, C. Biebersteini, Cineraria acanthifolia, C. maritima, Dactylis glomerata elegantissima, Euonymus radicans variegata, Gnaphalium lanatum, C. tomentosus, Polemonium

cœruleum variegatum, Salvia argentea, Echeveria secunda glauca, Stachys lanata, Thymus citratus fol. var., Veronica Andersoni variegata, V. incana.

Plants with Crimson and Bronze Leafage.—Alternanthera amabilis, A. amæna, A. paronychoides, Amaranthus elegantissimus, A. melancholicus ruber, A. tricolor, Iresine Herbsti, I. Lindeni, Coleus Berkleyi, C. Princess of Wales, C. Verschaffelti, Perilla Nankinensis, Echeveria metallica, E. racemosa, E. sanguinea.



Summer House in Moorish Style.

"To-morrow, ere fresh morning streak the east
With first approach of light, we must be risen,
And at our pleasant labour to reform
Yon flowery arbours, yonder alleys green,
Our walk at noon, with branches overgrown,
That mock our scant manuring."

MILTON.

UR first parents, if we credit Milton, (as we must,) were not wholly indebted to the spontaneous growths of their happy garden for their green bowers and mossy seats; but with delicate fingers wove the pliant branches into arches of umbrage, and set alleys of sweet-scented herbs before their favourite retreats. Who knows but that a fernery was one of their choice delights? Few rustic adornments would better have become their sylvan home, where shade and coolness, fragrance and verdure, softened the song of love and the hymn of praise.

The fernery belongs to the truly rustic rather than the rural department of gardening. Though ferns are beautiful anywhere, and may suitably adorn

the trim border, and mingle with ornaments of formal design, they are more at home, more befitting among tree-stumps, and in boldly designed rock-work or water-scenery, where they appear in their proper character of wildness and simplicity. For the sake of convenience, we may now consider the fernery as a special contrivance—a garden in itself; and usually it is so, being in some way or other separated from other scenes. The requisites of an open-air fernery are ample space, variety of sunshine and shadow, plenty of moisture, alternations of slopes, hollows, and acclivities of surface, and good shelter from high winds and frost.

In smoky town localities, it is difficult to establish ferns in the open air, owing to their delicacy of constitution, and impatience of a dry or smoky air. But in the suburbs of London, any of the ferns that are ordinarily grown in the open air will succeed, as we know by experience, and could name some very flourishing fern gardens at distances varying from two and a half to six miles from St. Paul's. In the experimental garden at Stoke Newington, all the hardy ferns, including even such peculiar things as the mountain parsley fern and the fountain asplenium, thrive in a most satisfactory manner.

Ferns artificially grown, and tended with proper care and skill, frequently exceed much in beauty those grown by nature. True, we cannot always secure the scene as well as the ferns—we cannot have the dark glen, the dank moss-grown cave, the decayed tree trunk, or the crumbling archway of the water-fall. The scenes amid which ferns grow, the lovely secluded spots which they seek out—shy wood-sprites that they are—are the chief charms of the associations they always suggest to us; for they do haunt the greenest and coolest nooks, the most mossy and ancient banks above water-brooks that trickle from unseen founts, in the deep recesses of wild rocky caverns, and under the branching arms of twisted grey-beard oaks and ancestral beeches—spots only discovered by the explorer of woodbine coverts and deep-hidden shades, where, searching for rare beauty, he finds it far excelling his anticipation, and checking his silent footsteps by sights that hold him breathless with surprise. Yet if we cannot have the mountain dells, and creeping thorns, and purple knolls of wild thyme, we may have the emblems of them in our mural paradise; we may have the ferns to suggest such things, and to keep alive remembrances of pleasures and of scenes that made a coolness in the brain and a freshness in the heart—breathings of fragrance from the green world that sweeten the resting-places in the march of life.

It is not requisite to the success of an out-door fernery that it should

be fantastic or complicated in design, but if anything like a collection is to be made, many varied positions and aspects must be provided to suit the various requirements of the plants. There may be a shady dell shadowed with a few large trees, where a fernery would be acceptable for its beauty and interest, and render a summer-house or rustic seat a more agreeable resort than it would be without a fernery. The capabilities of the district must determine the nature of the material to be employed. In the suburbs of towns

"burrs" from the brick-kiln are usually the best material available, and answer admirably. If the soil of the place is suitable the expense of carting in peat is saved, but if it is mere clay or loam, it will nevertheless serve for the foundation, for the strong-growing ferns, such as the common lastrea and the brake, will root down vigorously into it, if assisted in the first instance by planting them in a good fern-mixture. Although the subject admits of almost endless variety of treatment, we will suppose a case in order to sketch out a

mode of procedure, which may furnish the key for the formation of a fernery altogether different to the suppositious one that for a few moments will now engage

Woodwardia radicans.

our attention. There is then a quiet spot shaded by trees on the far side of the lawn, quite shut out from the flower garden by belts of shrub and a silvery stream. We shall dig out a broad and irregular trench and throw up

the earth to form banks and knolls. These we shall face with stone or burrs to form a picturesque scene, and provide for it a few distinctive features, such as groups of tree butts, an arch of thorn, or a pile of rock; the interstices communicate with a great body of sandy peat which is to be clothed with rock-loving ferns. Or we may on a hill commanding a view of the whole, construct a ruin, taking care to enclose in the walls an abundant bed of soil, so that ferns planted in the chinks and hollows will have a good chance of prospering. The very smallest thing possible for a feature would be an open central space, enclosed with a few trees of an airy graceful character, to avoid interruption of the view, and therein a quiet summer-house with a pile of rock at the entry, and a few grand specimen ferns perched on blocks of wood—a pleasant lover's retreat, or if we must ignore romance, a cool grot for a friend and a cigar. The sketch at page 319 is a hint for such a scene.

The banks and knolls should have a coating of sandy peat varying in depth from six inches to two feet, and here and there some of the burrs should be taken out, the natural soil below them removed to the depth of a foot or so, and the place filled up with peat. The ferns must be planted in positions suitable to the several kinds. In the lower and damper spots the lady-fern, the hart's-tongue, the osmunda, and the brake will thrive. On the more alpine spots many of the smaller ferns will prosper. On the slopes, and indeed everywhere, the common lastrea will take kindly to almost any kind of soil. There are many fine plants that associate with ferns admirably, and we have no idea of restricting the cultivator's range of choice to ferns only. The equisetums are most elegant in their outlines and colours, and well adapted for damp and shady situations. The hardy bamboos, and a number of fine grasses, not the least important of them being the pampas and the arundo, harmonize with the scene admirably. Bits of colour are not only admissable but desirable; the noble fox-glove, which never shows its beauty better than in rustic scenes, and the pretty trailing tormentil, with the violet and the primrose, have a perfect right to shine amidst the herbage and pave the slopes with flowers. But the walk through, what shall we do with it? Now here is just the place in which to grow the beautiful spergula, and wanting that, if the hollow walk is formed of peat, say only six inches deep, it may be planted with that very common weed, the pearl-wort (*Sagina procumbens.*) The ground ought to be carpeted, and we have for choice spergula, sagina, tormentil, prunella, wild thyme, and a hundred more good things that bear trampling on without harm. Why not mix them all together,—better such a carpet than a gravel-walk. Nor is

the wild wood ivy unfit to share the praise that beauty brings in such a scene. Let it run over the great tree stumps, and here and there climb to the top of a bank. The strong-growing ferns will rise up through it like gigantic shuttlecocks of emerald green, upon a lovely ground-work of dark glossy verdure. Let the rustic tone prevail throughout: have no roses, or geraniums, or vases, or artistic fountains. A stream of water, a tumble-down fountain, a rockery, a clump of birch trees, a cave with water trickling through and ferns clothing the sides and roof—these are appropriate accessories, and "bespeak the hand of taste."

As to conditions of success. Some ferns will grow in the most commonplace soil, such as we might find in a good kitchen garden; but no progress will be made in the proper sense of the word without plenty of heath mould or peat, or if that is not to be obtained, good leaf mould thoroughly rotted, or wanting that a mixture of chopped moss, cocoa-nut-fibre refuse and sharp sand. A great many of the most interesting ferns love sandstone and sand, and cannot be grown properly without these materials. Ferns that love peat, such as the beautiful blechnum, and the lady fern, will also grow luxuriantly in rotten wood; hence where tree-buts are employed, as in what we call a "rootery," these free-growing kinds usually attain to a high degree of development. But a caution here. Dead roots and all kinds of decaying wood are apt to produce fungi in visible forms not always desirable, and in invisible forms that are poisonous to the roots of every tree with which they come in contact. *Experimentum crucis.* Bury a few old roots of trees amongst your standard roses. They will soon produce masses of white threads (mycelium,) which will ramify and in time take hold of the roots of the roses, and the roses will then begin to decline in vigour, and will probably die if not relieved of the enemy. Every kind of tree is liable to injury from this cause; therefore in all cases where rooteries are found, the prudent artist will consider if the mycelium which is likely to be produced is likely to be productive of mischief.

A very simple, but decidedly picturesque mode of growing ferns in a collection by themselves, occurred to us a few years since through an accidental circumstance. We had, in a yard adjoining the garden, a large stock of faggots, tree loppings, bean-sticks, roots, and other forest refuse, and amongst them a number of old unbarked blocks, on which some fine ferns were rooted and flourishing. Setting to work one day to put the stack in order, and having a number of ferns for which there was no room in the garden, we

placed several dead trees of large girth to form the outlines of a large space. Within this the roots were packed with no particular order, and at the back a mass of rotten wood and moss, which had been collected for cultural purposes. The whole was roofed with loppings and bean-sticks, so as to

construct a sort of extemporaneous hermit's cell, or grotto of wood, into which no perpendicular light could fall, but the light entered freely at three of the sides. Here among the roots, on the ground, and on the bank of rubbish at the back, ferns were planted. Sufficient rain gained entrance through the

interstices of the roof, the ferns flourished, and a number of pretty wildings, including ivies and brambles, sprung up amongst the moss and peat used in planting, and in this way we came into the possession of one of the prettiest ferneries imaginable, though it was in a position quite unsuited to it, and at a distance had no more romance about it than belongs to any stack of faggots in a farmer's yard.

The space within measured about thirty feet by twenty, and was about seven feet high, the roof resting on rough props and the stems of dead pollard alders. Its appearance inside was beautiful; groups of brake and male ferns towered up among the dead branches, patches of holly fern and polypody covered the dark blocks and ungainly roots, the osmunda spread out its leafy fronds beyond the boundary of timber to the open air, and all over the ground where smaller ferns had even been thrown in and forgotten, new fronds broke out and covered the dusty floor with woolly croziers and bright green shepherd's crooks so completely and luxuriantly, that ever since we have regarded such a plan as just the one required for an outdoor fernery. If the thing is to be done again, it may be better done. Instead of throwing the materials together pellmell, select a number of unbarked pollards, some large knotted loppings of old plum, or apple, or oak trees. With these construct a frame-work, setting the supports at the corners, and making a very light roof of rough trellis. Then plant it round with fast-growing climbers, some of which should run up light posts midway between the corner pillars; and construct green walks, with plenty of open spaces for the admission of full daylight, as also for the entrance and exit of the cultivator and his visitors. The roof should also be covered, and indeed to a great extent formed of greenery, and the knife and shears employed to keep the trailers within bounds, so that they may not obstruct either daylight or rain, but effectually screen off the mid-day summer sun.

Then inside build a bank of fern compost, with a bottom of brick rubbish; in one corner, where light comes in plentifully, make a hollow, and puddle it with clay, and then spread in it a foot of peat for some of the marsh ferns, and others that like moisture at their roots. A little rock-work, formed of dark stones, or the burrs from a brick-kiln, would round off the corners and slopes of the bank; and about the ground place a few huge tree roots, also to be planted with suitable ferns. In such a space you may find room and proper positions for every one of our native ferns, except such few as it is not possible to cultivate out of doors. There would be a fernery and bower combined, green and cool, and dark at all times, a charming place in summer,

and not quite a desolation in winter; for with the shelter afforded, especially if the side towards the east were made pretty close with rustic trellis, the majority of the plants would carry their fronds through the winter; and by draining off superfluous water a warm air would prevail within that would be just sufficient to bring them on early in spring, without weakening them so much in autumn as to risk their winter existence.

The shedding of the foliage of the trailing plants outside would give freer access to the light in winter, and the strong light of summer would be shaded off by the thickening of the foliage then; but if at that bright season too deep a gloom prevailed, it would be the fault of the pruning-knife, not of the scheme itself. It would cost next to nothing, for if you were tired of fern growing—and the attentions requisite would in this case be reduced to a minimum—you might pull down the structure, and get back the cost of the timber by turning it into firewood; and as the ferns and other plants would increase considerably, the nursery stock would be worth more than it was at starting, so that a fernery of this description is cheap enough for the humblest lover of the beautiful, and choice enough for the most wealthy connoisseur of taste in gardening.

"Example is better than precept," so we introduce here a short account of the noble fernery at the Abbey gardens, Ramsay, the work of our able coadjutor, Mr. J. Howlett. This fernery is cut through a shrubbery, in the form of a pit, so as to create a huge hollow suitable for ferns, and also to afford facilities for the production of picturesque effects. Mere piles of rock and root-work planted with ferns are always agreeable accessories in garden scenery; but their obviously artificial character renders them at all times liable to severe criticism as pretexts and shams; but it is better, in most cases, where it is desired to grow ferns in small gardens, that there should be subjects for ungenerous sarcasm than that the cultivator should go without ferns altogether, because he cannot command space for extensive banks and hollows and the accompaniments of rock-work, more closely imitating nature than the miniature piles generally resorted to. Here, however, the plan adopted is such as to connect the obviously artificial with the apparently natural in a most agreeable and appropriate manner. The excavation is about one hundred and eighty feet in length; the soil removed is thrown up to form the banks, ranging from twelve to sixteen feet in height, and arranged in irregular windings and bays so as to afford suitable positions for groups of the most characteristic ferns. The fernery is approached by a walk, over which there are five arches, each ten feet high.

The first of these, at the entrance, is an iron arch of heavy design, opening by an iron gate, and festooned with hops. The second arch is of wire, and covered with convolvulus. The third arch is of stone, and forms a bridge across the chasm to connect the banks together on either side. The walls of this are covered with ivy. The fourth arch is of wire, and covered with wild convolvulus. The fifth is stone, covered with ivy, and on the right of this is a waterfall which, flowing into a recess in the lower part of the ground, supplies the conditions rquisite for aquatic ferns and grasses, and gives a pleasing variety to the scene. The walk is irregular—in some places thirty feet in width, in others six feet. This, of course, causes the banks rising on each side from the walk to present a variety of features, and the narrowest parts being chosen for the arches, every arch commands a distinct and beautiful scene. Those portions of the banks that rise abruptly are kept up by means of rough blocks of stone and clinkers, which prevent any crumbling down of the earth upon the walk. The banks are planted with British ferns and flowering plants, and on the summits of the banks are masses of shrub, polled ivy, rough arches of hops, and other masses of foliage, to shut in the scene, and while giving it seclusion, they contribute also to keep it shady, to the benefit of the ferns. The soil being not well adapted for ferns, a large quantity of good loam and leaf-mould was previously prepared for the purpose, and all the ferns were planted in this artificial soil, those preferring to be always moist at their roots being planted at the base of the banks or near the flow of water; those on the banks have in most cases stones or clinkers placed round them to protect their crowns, as the banks being in some places very steep, there is always a liability to a crumbling of earth upon them. These also serve to keep the roots moist.

In addition to the trees which fringe the summits, and break the continuity of the banks, there are many distinct clumps formed of old hollow trunks of trees, and most of the best specimen Athyrium, Osmunda, etc., are planted in tree roots in various positions in the widest parts of the walk; these add much to the interest of the whole scene, and prevent any lingering appearance of formality. In fact, it was an object from the first to make the scene as much as possible like a natural dell, and since mosses and other plants common to such places have sprung up in plenty, that object may be said to be thoroughly realized.

The fernery is chiefly planted with species collected in the district. The most conspicuous and handsome species of ferns are Polypodium vulgare, phegopteris, vulgare bifidum, a very handsome variety; Polystichum aculeatum,

THE FERNERY AT THE ABBEY GARDENS, RAMSEY.

angulare, lonchitis; Lastrea filix-mas, dilitata, thelypteris, spinulosa, cristata; Osmunda regalis, grows finely near water, or on a damp and shady bank; Scolopendrium vulgare, S. v. sagittifolium, and some other varieties; Asplenium adiantum nigrum, A. ruta muraria, a beautiful dwarf fern for planting among stone-work, or where it can root in old mortar; Adiantum capillus veneris, or common maiden-hair, also suitable to grow on shady walls; Pteris aquilina, or common brake, this is planted in large quantity, and forms grand masses on the banks; Blechnum spicant and Athyrium filix-fœmina are largely used on the fronts of the rockeries next the walks, where they form beautiful spreading tufts.

Among the flowering plants are Foxgloves; Epilobium roseum, a showy willow herb; double Feverfew; Hypericum quadrangularum; Centaurea Babylonica; Eupatorium cannabinum; Campanula rapunculus; C. rotundifolia; Linaria vulgaris; Achillea millefolia; Scabiosa arvensis; Ajuga reptans, the bugle; Sempervivum tectorum, the common house leek; Borago officinalis, the common borage; Spirea ulmaria, the meadow sweet; variegated sage; variegated thistle, Carduus marinus; Solanum dulcamara, the deadly nightshade; Vinca major and minor; Sedum acre and glaucum; Saxifraga granulata, umbrosa, and cœspitosa; Ononis spinosa, the rest harrow; Verbascum nigrum, or black-rooted mullein; Lunaria biennis, or honesty; Coronilla varia; Achillea ptarmica flore pleno, the double sneezewort; Cardamine pratensis, the cuckoo flower; Cerastium tomentosum; Hesperis matronalis; Butomus umbellatus, the flowering rush, grows well under the waterfall. Also in clumps, in positions suited to their several habits, cowslips, primroses, violets, antirrhinums, rock and shining lychnis, columbines in variety, lily of the valley, rock rose, or cistus. These produce a gay effect amongst the ferns, and at all seasons of the year there are many species in bloom, so that the scene is always beautiful and interesting.

The plan adopted at Ramsey may not suit in many cases where there is no lack of spirit and taste in the embellishment of the garden; nor indeed can we propose a plan adapted for universal use, but we have, we trust, sufficiently explained the necessary conditions of success, and it must be remembered that a fernery is intended for the growth of ferns, and therefore the conditions favourable to the growth of ferns must be found or provided for them. Now it often happens that a gravel-pit, or the site of a moat that has been dried, or an excavation from which marl or mould has been taken, presents a difficulty to the gardener, whose first question to himself is, "How shall I fill it up?" and next, "How will it look if I leave it alone?" If

we could regard the hollow or pit as the foundation of a fernery, the excavation becomes at once a gain, for there is so much work done towards the formation of a beautiful feature in the garden. The rest is easy. Break down the sides in places to form slopes and bays; open a way through; bring in roots, rocks, suitable soil, ferns, ivies: call upon the fancy, persevere, and in due time you shall have a glorious fern garden. To secure a dell or hollow ready made is so great a help that there should be no thought about filling it up in the mind of a lover of ferns, until it is clearly apparent that it is not fit, and cannot be made fit, for the purpose we propose to adapt it to.

A SELECTION OF ONE HUNDRED SPECIES AND VARIETIES OF HARDY FERNS.

The undermentioned selection includes only the most beautiful hardy ferns at present in cultivation, and those only are named which will grow on an ordinary rockery without any special treatment.

British.—Adiantum nigrum, Asplenium lanceolatum, A. trichomanes cristatum, A. t. lobatum, Athyrium filix-fœmina, A. f.f. compositum, A. f.f. conioides, A. f.f. corymbiferum, A. f.f. diffissum, A. f.f. diffisso-multifidum, A. f.f. Elworthi, A. f.f. Fieldiæ, A. f.f. Frizelliæ, A. f.f. frondosum, A. f.f. gracile, A. f.f. grandiceps, A. f.f. Grantiæ, A. f.f. laciniatum majus, A. f.f. multifidum, A. f.f. plumosum, Blechnum spicant multifurcatum, B. spicant ramosum, Ceterach officinarum crenatum, Cystopteris fragilis, C. fragilis Dickeana, C. montana, Lastrea æmula, L. cristata spinulosa, L. dilitata angustipinnula, L. dilitata collina, L. dilitata grandidens, L. filix-mas, L. f.m. Bollandiæ, L. f.m. cristata, L. f.m. angustata, L. f.m. furcans, L. f.m. grandiceps, L. f.m. paleacea, L. montana crispa, Osmunda regalis, O. regalis cristata, Polypodium alpestre, P. alpestre flexile, P. dryopteris (Oak fern,) P. phegopteris (Beech fern,) P. vulgare, P. vulgare cambricum, P. vulgare cristatum, P. vulgare omnilacerum, P. vulgare semilacerum, Polystichum aculeatum, P. aculeatum lobatum, P. angulare acutilobum, P. angulare brachiatum, P. angulare concinnum, P. angulare cristatum, P. angulare grandiceps, P. angulare grandidens, P. angulare latipes, P. angulare oxyphyllum, P. angulare plumosum, P. angulare proliferum, P. proliferum Wollastoni, P. angulare tripinnatum, Pteris aquilina, Scolopendrium vulgare, S. vulgare bimarginato-multifidum, S. vulgare contractum, S. vulgare cornutum, S. vulgare crispum, S. vulgare crispum majus, S. vulgare curiosum, S. vulgare digitatum, S. vulgare laceratum, S. vulgare macrosorum,

S. vulgare multifidum, S. vulgare ramo-marginatum, S. vulgare ramosum majus, S. vulgare submarginatum.

Hardy Exotic.—Adiantum pedatum, Athyrium asplenioides, A. asplenioides purpureum, A. tenuifrons, Crytomium falcatum, Cystopteris bulbiferum, Lastrea intermedia, L. marginalis, L. chilensis, Osmunda cinnamomea, O. Claytoniana, O. regalis purpurescens, Polystichum Brauni, Pteris aquilina Americana, Struthiopteris Germanica, S. Pennsylvanica, Woodwardia areolata, W. Virginica.

A few clumps of the "Horse-tails" planted amongst ferns produce a pleasing variety, and of these Equisetum arvense, E. Mackai, E. Moorei, E. sylvaticum, and E. variegatum Wilsoni, are the most beautiful and distinct.

For carpeting the surface, and trailing over the mounds, ivies are invaluable; the most suitable are Hedera helix, H. h. heterophylla, H. h. lucida, H. h. nigra, H. h. pedata, H. h. marginata grandis, H. grandifolia, H. g. viridis, H. g. maculata. A few tufts of the variegated forms of Vinca major and V. minor, intermixed with the ferns, will add much to the beauty of the scene.

"I know a bank, whereon the wild thyme blows,
Where ox-lips and the nodding violet grows,
Quite over-canopied with luscious woodbine,
With sweet musk-roses, and with elegantine."

SHAKSPERE.

THE mere mention of rock-work is usually sufficient to raise a smile on the face of one who has some taste and knowledge of the matter. Of all the mistakes that are made in the embellishment of gardens, the rockery is but too frequently the most ridiculous. If we stroll through any of the popular places of out-door resort, we are sure to see plenty of rockeries and raised banks; they abound in place and out of place, and when they *are* appropriately placed it is after all a matter of chance, because, as they are sprinkled about everywhere, some few, like seed scattered by the wind, are sure to fall into suitable situations. The same may in a certain sense be said of the rockeries in private grounds, and it really makes one feel melancholy to reflect upon the waste of money, time, and ingenuity involved in the construction of many of them.

Take a flower-garden, and in the midst of it make a pyramid of vitrified bricks and flints, or throw up a hillock of huge stones, and set upon the top of it a small plaster statue, or a cast of Queen Elizabeth, or Shakspere, or Paganini; daub the stones over with blue and green paint—in fact, moss

them and bronze them, and use plenty of colour. Then stick in anywhere a geranium, a fern or two, put a few shabby lilacs at the back, and make round the whole a gravel-path, edged with white flints or brick-rubbish, to correspond with the eminence, and you have one of these "model rockeries" that delight Londoners when they take their walks abroad, and which many of them copy in arranging their own grounds. It is the best fun in the world to visit a garden where there is plenty of rock-work; but you must be reticent as to your opinion of it, or risk all the consequences of giving an unforgiveable offence, if you should speak your mind upon the matter.

Rock-work of a certain kind is admissible almost anywhere—in a tank of marine fishes, in a tank of river-fishes, in a fern-shade, in the basin of a fountain, at the point where walks meet in flower-gardens, and as objects on which the eye may rest in walks through lawns, shrubberies, and wilderness scenery. But in every case the material must be adapted to the work, and in all coloured and formal scenes, the rocks should be used in huge blocks in piles and mounds, not to imitate caverns and rude cairns, but strictly as ornaments to set off the beauties of other objects, or to give light or shadow as the case may be. This is rock-work, not rockery, and it involves the disposal of rough blocks in symmetrical masses or groups, not in wild and fantastic outlines, and it conveys the idea of artistic repose, not natural and rugged sublimity. The two ideas must not be confounded, for while a *rockery* may be a most fantastic, gloomy, romantic, or savage scene, according to the desire of those who construct it and its fitness in this or that form to the scenes in which it occurs, *rock-work* must be artistic and elegant, every puerile conceit banished from it; and the rough unhewn material used simply, because *that*, in the hands of an artist, may be made as appropriate and beautiful as the exquisitely sculptured forms which the chisel *might* have obtained from it. We put rocks in cabinets, and a mighty block of granite may be quite appropriate even on the terrace garden, and there, indeed, it may serve as a memorial of an event worth remembering.

Suppose you have a neat little flower-garden, with a wooded lawn adjoining. This lawn, especially if it has a border of fruits, will be as frequently resorted to as the walks through the parterres. Your long walks under embracing branches will be pleasant at all seasons, but much more pleasant both to you and your visitors if there are some few special arrangements made to please the eye. The gloom of green foliage is delightful, but how much is the joy of an avenue enhanced if light is seen at its termination. Now a border of

shrubs, a bank of ferns, a bosky corner, or walks diverging into other scenes, may form the vanishing point of your perspective, and the calm shade has no relief therein. Let the gardener get together a barrowful of white stones of any kind, the larger the better, and let these be thrown down "any how" at the end of such a walk, and in an instant the entire aspect of the scene is changed. So far the object is accomplished; a bank of light stones is evidently just the thing to make the avenue charming. It is of course not to remain for ever a mere barrowful "flung into the void," but is to be built up neatly and properly planted, and may at last become a cairn after the fashion of the adjoining figure.

Many uses for rock-work may be found, even in the immediate vicinity of the house and flower-garden. Wherever it is so used, it must be bright and artistic, pleasing the eye by contrast to the orderly lines that prevail around, yet harmonizing with sculpture, if need be, and with the bright scene it occupies, and its use made legitimate by a display of plants that trail elegantly, or that look best when spread over raised surfaces, as most alpines do. Then where mounds are used there is no better mode of constructing them than to form the foundation of brick-rubbish, and cover the whole with huge dark stones, or with those conglomerated bricks which are cast from the kilns as refuse. If

alpine plants are to grow on such a rockery, there should be provided for them a good depth of sandy loam, for unless they can root deeply they will not thrive. Ivy grows slowly at first; it taxes one's patience when it is wanted as a distinct furnishing element, and while it is in progress the appearance of the mound, if tastefully built, is at least pleasing. Annuals of quiet colours and a few greenhouse perennials may be put out on the pile, and neatness and completeness may thus be attained at once, and the smaller aids dispensed with as the ivy makes its second spring growth, and promises to cover the whole with its glossy wealth of green. In the planting of ivy in these mounds strong plants should be employed, and April is the best season to plant them.

Now as to another sort of rock-work for the strictly ornamental ground, let us take even the smallest of suburban or town gardens, measuring say from sixty to ninety feet in length, by from twenty to thirty in breadth. The garden is bounded on three sides by walls, and on the fourth by the house. It is laid out with a central grass-plot and flower-beds. Around the walls runs a narrow border, separated from the grass-plot by a continuous path. The walls must be covered with ivy, clematis, jasmine, and other climbers; and if the evergreen shrubs are well disposed, and the flowers grouped in good masses of colour, the scene will be pleasing, and afford as much space for gardening labours as most people having but moderate leisure will be able to cultivate. Let the border under the rear wall be raised into a bank, with a facing of large burrs, such as are supplied for the purpose, the lower tier being sunk a few inches below the surface. A few large rough blocks of limestone, or any other grey or dark rock, may mingle well with the facing; and on the upper tier some large dark flints may be set. The mass of the bank is composed of rich sandy loam, and the rock-work is so arranged that there are plenty of interstices for the insertion of plants in the front. A white poplar, birch, or tree of any kind, will be an improvement if planted towards one side in the midst of a mass of hollies and junipers. The bank should have either a concave or a convex outline, but there should be no "inns and outs" about it in so small a space, one good curve being quite sufficient. Towards the adjoining borders it should slope into the general level of the garden, but the level of the bank should not be uniform throughout—one side should rise higher than the other.

Now plant the wall behind it with ivy, virginian creeper, white jasmine, or any thick, shrubby, and *dark* climber. Fig tree, pyrus, or clematis would be suitable, but a dark background will be most effective. The surface of the

bank may then be planted with showy flowering plants of almost any kind, and the front rock-work with a few good alpines, or some bright verbenas, heliotropes, hawkweeds, yellow and white alyssum, and in one corner ivy, which should be trailed over the stone into a rich knoll, so as to contrast with the flowers beside it. The slopes adjoining the side borders should be studded with crocus, snowdrop, narcissus, jonquil, crown imperial, gladiolus, and other good bulbs, so that at all seasons they will glow with colour, and be crowded with a gay pendent foliage. On a few ledges in front of the bank a few ornamental grasses would look well, while, as a matter of course, the several choice varieties of stonecrop, houseleek, and such favourite alpines, will not be forgotten.

From the house such a bank would be at all seasons beautiful. Its elevation and the mingling of various-coloured foliage and flowers in the dark rock-work, which every year would improve with weather stains, would render it a pleasing background, and prevent the eye from wandering beyond. Yet this would not be a rockery strictly, but a raised bank, faced with stones and clinkers, and devoted to miscellaneous showy plants, rather than to alpines. Smile not, ye redoubtable critics who take large views of things: a rockery of this humble sort, if well made and well kept, will make a blessed break in the murky monotony and customary flatness of a town garden.

Now every ornamental pile or mound may be treated in a manner similar to what I have just described for the bank at the rear of a suburban garden. Wherever you want a bit of rock-work build it up with one kind of material only—no mixtures of colours, no shells, no gingerbread of any kind. Let the mass be sufficiently bold, but subordinate to the general scheme of the garden, for it is not in any case to form a special object of attraction, but is intended only to diversify the colouring and character of the scene. Within a considerable distance of your house it ought to be impossible for you to say to a friend, "come and see my rock-work," because it should have no special importance at all. But in making it subsidiary it may still be beautiful. In a dark bowery spot, where light is wanted, it should be formed of white stones; in an open space where a dark mass would give relief, there use the refuse of the brick-kiln or furnace slag, using large blocks only outside; the small stuff will do for the foundation.

Where a few large blocks are used to adorn a terrace or a lawn, they ought to be handsome specimens of some interesting stone, such as two or three immense blocks of granite, or porphyry; they must have majesty of aspect and richness of colour; and to give them a perfect right to the place they occupy, the

owner should have a story to tell about them—when and where quarried, the cubic measurement and weight of each block, the nature of the strata to which they belong, and whatever details of geological or geographical interest may attach to them. If a philosopher can give you a four hours' lecture on a wayside pebble, surely your mineralogical ornaments must be capable of yielding some items of amusement and instruction.

About flower-gardens, and all bright orderly scenes, every bit of rough stone should be made beautiful with flowers. A very few plants will in such cases produce an effect, for there is no position in which flowers look more grateful to the eye than when springing from the clefts of a boulder, or the sides or summit of a dark mound. The eye is arrested at once, and art seems to have set a chaplet on the brow of nature. All creeping and trailing plants that flower gaily, and that endure a season, are suitable, except of course those of large growth; and where the bank does not offer a suitable soil for them, ten minutes' labour with a trowel will suffice to remove a stone or two, or the soil from between them, so as to make room for sufficient of the proper compost in which the plant will prosper. If sandy loam, with a moderate admixture of leaf mould and well-rotted manure, is used in the construction of the mound, a foot deep all over its exterior, there is scarcely anything you may wish to plant in it but is sure to flourish. Plants that spread or trail, such as geraniums, verbenas, and petunias, will suit better than those of stiff growth, such as asters or chrysanthemums. They should be gay ones too, and but *sparingly* planted.

We shall now say a few words on the rockery and rootery at Stoke Newington, because we consider it a good example of what may be done to increase the attractions of a suburban garden. It is, however, proper to state that it was originally constructed solely as a screen, to shut out from view the lower part of the garden, where experimental operations render privacy desirable, and where, moreover, there is nothing for people to see. The primary object of the proceeding has been fully secured. The frame ground and plunging beds are screened from inquisitive eyes, and there is less interruption of the work than was the case once upon a time. But the ruin is a real embellishment, and it affords sites for a large number of interesting and beautiful plants. One effect it produces, which is doubtless worth mention. It gives to the garden at the point where it is seen in its full extent an appearance of expanding out to a great breadth, though it is no wider there than anywhere else. This is owing to the number of separate objects which present themselves in nearly an unbroken line right across the garden, and as they are all connected and in

ROCKERY, SUMMER-HOUSE, AND BEE-SHED AT STOKE NEWINGTON.

perfect harmony as parts of a rustic scene, the eye is pleased with the variety and the expansion which are secured by the arrangement.

This rockery consists partly of banks faced with burrs, and partly of artificial ruins. The entrance to the scene, at A, is by a walk which divides right and left, leading one way to a summer-house at C, another way to raised banks at D, and the principal walk is also carried through the rockery, and then leads the way, B, to the lower part of the ground, which this construction hides from view. At E and F are parts of two large semicircles which abut upon the front of the rockery; at G is the bee-shed, the thatched roof of which is a pleasing feature in the perspective view.

It will be observed that the principal part of the rockery is a sort of bastion with arches. The walk down passes through the bastion, and the design of the whole is perhaps a little fanciful, and would puzzle both military and civil architects, though there is really nothing at all extravagant in any of the details. The bastion was constructed with the largest burrs that could be obtained. By the term "burrs" is meant the great blocks of half vitrified brick which are thrown out of the kiln as useless to the builder. The demand for these has become so great that in London they are expensive articles, though but a few years since the cost of carriage was about all that was of necessity incurred in obtaining them. The walls of the bastion are filled in with earth, and for the guidance of any reader who should wish to adopt a similar contrivance, it must be remarked that such walls should be at least three to four feet thick, so as to enclose a large body of earth, for plants growing on such walls will occasion very much trouble in watering, etc., to keep them alive during hot weather if there is but a scanty body of soil in the walls. Of course, in the process of building, openings were left, and numerous irregularities were produced intentionally, so as to form receptacles, basket-like recesses, and chinks and hollows for plants. In order that the whole body of earth in the walls should be moistened by rain, the summits of the walls were not covered in, but were planted with various shrubs, succulents, and other plants of kinds suitable for such a position, the relative dispositions of the materials of these walls may be understood by the annexed diagram:—

GROUND-PLAN OF ROCKERY AT STOKE NEWINGTON.

The word "rock" stands in this case for a facing of burrs. A few "butts," as the gardeners term the stumps of trees, have been worked in, and one of the prettiest effects is produced by a tuft of that noble grass *Elymus arenarius*, planted in a large butt on the left, near the summer-house.

The banks on either side of the walls are raised from two to five feet high, and the walks are planted with *Sagina procumbens* in the bays and recesses, because gravel does not long preserve a sightly appearance in such places, and the sagina forms a green moss-like growth. In a peaty or sandy soil, mosses would grow freely in such spots; but in our heavy clay land, mosses have no beauty. All the walks necessarily used are, of course, gravelled and well kept.

The summer-house is as much benefited by the rockery as the experimental ground. For as this retreat is chiefly used all the summer long as a sanctum for literary work—this, and many another book, and miles of magazine articles, have been written in this snug retreat—its separation from the working department is a matter of great importance, and we enjoy the immense advantage of writing in the garden, and being at hand to direct the garden work. The service rendered by the rockery in screening the bee-shed from the upper end of the garden is something worth considering; the bees always sail high up over the arches and trees, and a stranger would scarcely discover that there were bees in the place, especially if not admitted beyond the front of the rockery.

In the nook on the left there are numerous fine examples of hardy ferns that have grown to great dimensions. This nook is quite shaded, which is not the case with the banks D, and the soil is made for ferns, and consists of good peat and silky yellow loam, chopped up together. Here of course are great tufts of hardy ferns of many kinds, and the background of this nook consists of bracken, which has attained to a remarkable degree of luxuriance, and has a grand appearance, towering up in front of the dark ruin.

Though on so small a scale, this rockery constitutes a series of three distinct gardens. First, we have on the summit and sides of the walls of the bastion numerous succulents, and a few alpines. The position is not well adapted for ferns, though we could keep them there by regular watering. It is much better, however, to plant a position so that the least possible care will be required; at all events, our rule is never to make work, there is too much of that already; so we plant things in such a way that they will, generally speaking, take care of themselves. The mesembryanthemums are invaluable for such a purpose, and their free and abundant flowering give them a first claim to consi-

deration for positions much exposed to sun and scantily supplied with moisture. The sunny banks on the right serve for herbaceous plants, and a few choice trees and shrubs; and on the left of the bastion is the fernery.

From rockwork and small things let us now turn to the rockery, which must be something great. It must be far removed from the dressed grounds, have an abundant shelter of trees, and perhaps of natural irregularities of the ground, to produce seclusion and be altogether such a place as a hermit might dwell in without being often disturbed by the noises of the great world.

Welcome silence! welcome peace!
O most solemn, holy shade!
Thus I prove, as years increase,
My heart and soul for quiet made.
Thus I fix my firm belief,
While rapture's gushing tears descend,
That every flower and every leaf
Is moral truth's unerring friend.

BLOOMFIELD.

The general plan of a rockery must always be much influenced by the peculiarities of the site and the materials readiest to hand for its construction. A disused stone-quarry with a natural stream adjacent, afford happy aid towards the production of a beautiful scene with the fewest incongruities. Wanting a stone-quarry or a chalk-pit, excavations resulting from marl or gravel digging, may be found admirable substitutes, and will probably afford from the first a series of bold outlines and escarpments, which we should scarcely equal for picturesqueness if commencing the work *ab initio*, with none of the accidental aids of those who for other purposes begun the work. Two objects must be kept in view from the first, namely, to fashion the scenery surrounding the rockery so that the whole shall harmonize, the walks thither becoming wilder and losing themselves at last amongst scattered boulders or heathy slopes, or amid romantic gullies clothed with ferns in the shade of tremulous birch trees overhead. Another object should be to render the rockery itself as much as possible a natural scene. If, having constructed the whole artificially, it should seem as if nature had there scooped out the lake, and sent the chiming rill to trickle amongst rocks, flung down by titans in antedeluvian wars, so that few would guess the work to be that of a living human artist; then indeed we should have the best that art can do, and its principal merit would be its concealment of the hand of the artist. In a district where stone is readily obtainable,

the construction of a noble rockery is a comparatively easy task, but it is otherwise in the great flat ranges of clay and sand and peat in all the eastern counties of England. An idea for the kind of effect to be sought is here offered, but we are bound to say it is not a fancied scene, but a sketch of one we constructed many years since, in a district where the employment of stone was not to be thought of, and the bricklayer did the work with bricks and cements only—poor substitutes, we must confess, but as to that matter very much depends on the degree of skill exercised in the doing of it. The builder must aim at the construction of large masses, and must pile them, however irregularly, on some definite plan of stratification, and must moreover take care at certain points to introduce large masses of earth, to afford root-hold for a sufficient vegetation. In preparing plans for such works, considerable aid will be derived from an inspection of sketches or photographs of natural scenes, and we know not indeed why every artificial rockery should not be in its way a picture of fact. If we prize the work of the landscape painter for the adornment of our chambers, and obtain models of ships, cathedrals, and ruins for our cabinets and museums, there can be no inconsistency in making a rockery represent something of known interest in the natural world! Say then for the sake of an example, you go to Lynton for an idea, and when you return home you will exercise your skill to reproduce in your own grounds the far-famed valley of rocks!

How should we gratify our own desires in this matter of rockery and wilderness? Oh, with a view to the hermit life certainly, but intermittently eschewing none of the delights of society and the snug fireside, but looking to the hermitage as a place of resort for reading and meditation, or for an hour's earnest talk with the most familiar friend. We should need a great range of pleasures linked together, savage cliffs on one side, mossy knolls upon another; we should look for gardens of alpine plants, bowers for singing birds, a trout stream to attract the kingfisher as well as to invite the angler, and send a winding silvery line through all our sylvan grots and flowery glades. Just in such way should we construct our peaceful nest in the depth of a wilderness, where mossed walks are chequered by the shadows of interlacing branches, and the light softened by masses of foliage and forests of grey stems and ancient tree boles, raise a mound of softest turf to lead the way through a heathery to a genuine grotto of ample dimensions and fantastic design. No parlour fancies of propriety should prevail here, nor should any paltry conceits mar the wildness of the scene. The hill slope should look to the north, and

ROCKERY AND WATER SCENE.

break into rounded knolls covered with the choicest heaths; the hollows and slopes should be covered with ferns, and in whatever direction the eye should wander it should catch sight of huge masses of lastrea and brake, and royal osmund springing like emblems of witchcraft from the mossy turf and the cushions of ling and thyme, and harebells and orchises; and the distance should embrace a prospect of fine open country, or woods rising one above the other, till the neutral tints blend with the grey heaven and the rolling clouds; or if nature denies such help, plant the shrubberies through which this "nest of coolness" is approached so as to hide every trace of the flowery lawns, and make the house and its surrounding parterres utterly invisible. There should be slopes below, dotted here and there with knolls of thorn, irregular masses of elm, ash, sycamore, beech, dogwood, service tree, hazel, oak, and pine, and a few lady birches standing alone should be somewhere visible. If ivy, bramble, honeysuckle, briony, and other of the strong-growing wild creepers took possession of these sylvan scenes, they should riot amongst them, so that no view was shut, or walk choked, or open space of lawn disfigured.

> Paths there were many,
> Winding through palmy fern, and rushes fenny,
> And ivy banks; all leading pleasantly
> To a wide lawn, whence one could only see
> Stems thronging all around between the swell
> Of tuft and slanting branches; who could tell
> The freshness of the space of heaven above,
> Edged round with dark tree tops? through which a dove
> Would often beat its wings, and often too
> A little cloud would move across the blue.
>
> KEATS.

The orchises and heaths, and smaller tribes of wild thyme, harebell, ground ivy, and hound's-tongue, should dazzle the eye and perfume the air, and help in the serene enjoyment of this nook. The orchises should have a deep bed of strong maiden loam, with a plentiful admixture of chalk; they should be brought from their native meadows in April, each with its own soil about the roots, and set out on slopes facing the east, and with the partial shade of the trees surrounding the grotto. When planted every bloom should be nipped off, and then for many years to come they would enamel the ground with their choice colours, and afford delight with their quaint resemblances to bees, birds, butterflies, and lizards—the clever mimics of the vegetable world.

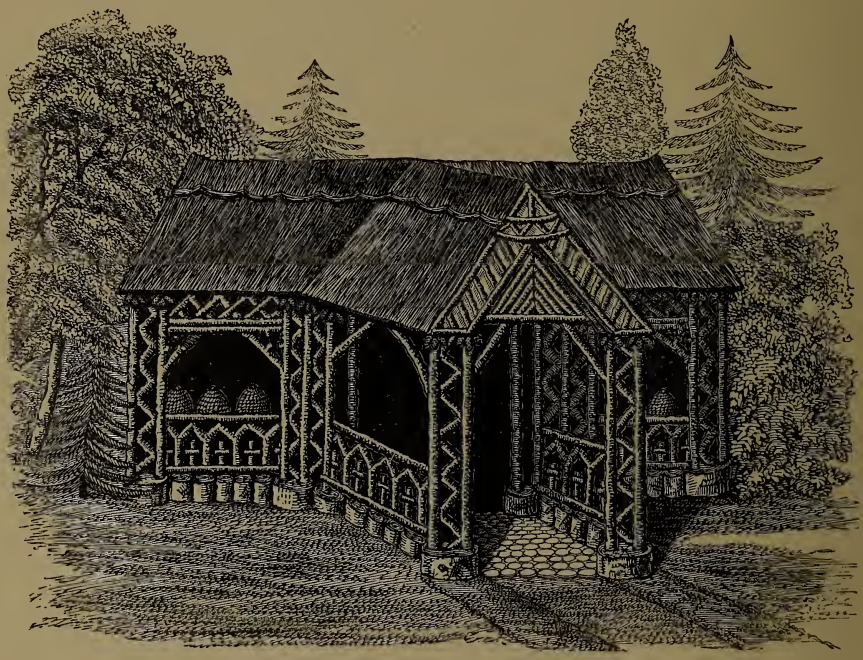
The heaths should dot the rising ground in clear patches, backed by the ferns and other plants of large growth. They should have a northern aspect, or at least be shaded from the full play of the meridian sun. The soil should be peat, turfy loam, and sand, in equal proportions, not a fragment of it sifted or broken, but intermingled rather with broken sandstone and harsh gritty refuse from banks and rockeries elsewhere.

Having thus planted the knoll with ferns, heaths, oxalis, violets, wild thyme, orchises, and the choicest wildings that nestle in hedgerows and in the shadow of the woodside, and adorned it with rough blocks and tree stumps, we would complete it by the erection of a grotto. It should be a bark house, backed by a huge wall of rock, round and past which it should be impossible to pass, or even to peep, owing to the thickness of the underwood for many square yards around, matted about the stems of the trees, which latter should be planted close as soldiers in file, yet as disorderly as an election mob. A rockery or a grotto should never be placed so as to admit of inspection on all sides. The house should be rude in structure, most fantastic in design, and of ample dimensions. A couple of huge oaks on the summit of the mound should stand on either side as giant guardians, and between them should rise the pointed roof of bark, with a sloping penthouse, supported by fantastic unbarked tree stems. Mosses, lichens, and masses of stonecrop and perriwinkle should dangle from the roof, and honeysuckle and ivy should mantle over it and around the guardian oaks, so as to festoon the whole.

A sundial should stand on the turf at the entrance, and on one side of the grotto facing the east there should be a rustic alcove for a row of straw bee-hives, under cover of the penthouse; but the hives should be outside entirely, so that we could sit within and hear the music of the band without ever being disturbed by one stray bee. A rustic table, a rustic bench, and a locker would be useful, if ideas of pic-nicing came into one's head; and there might advantageously be provided an inner chamber furnished with a couch, a locker for such a thing as a bottle of red wine and a box of cigars, and a few of the choicest books, quaintly bound, and arranged neatly in a recess. Jean Paul Richter should be there, along with Tennyson, Keats, Robert Browning, Chaucer, Spenser, Shakespere, Victor Hugo's poems, a few Danish and German poets, Oehlenschläger, and Körner, and a good Göethe, with all the best English books of Natural History, from Ray to Jesse; and Gilbert White should smile upon them all.

A side window of stained glass, hidden outside by a screen of ivy, would

admit sufficient light, without betraying to the eye of the curious this hidden and secret bower of repose. As for the rest, many additions might be made inside and out; curiosities of all kinds should be there, but as individual fancy is to have full swing, no more shall be said about this rustic grotto, except that on one side the entrance should be shaded by a mountain ash. One thing, however, must not be forgotten: birds of all kinds should be encouraged to



Rustic Reading Room and Bee-shed combined.

build in the midst of every green retreat. Magpies and daws are as amusing as nightingales and thrushes. The latter are sure to come without invitation, and you will not need to pine for Jenny Lind; but the larger birds must be domesticated near the spot, and allowed to recover the use of their wings by degrees. Here is a "cooling covert 'gainst the hot season," commanding the heavens to the north, east, and west.

At midsummer Phœbus at his rising would splash some gold from his chariot wheels upon the threshold of the grotto and the slopes of the mount, and the glories of daybreak as seen thence would at least be a temptation to early rising. Sunsets would be as attractive when the day "dies like the dolphin;" and in the depth of wintry frost, what a superb spectacle would be the greater and lesser bears, wheeling round the pole in the centre of a whole hemisphere of glittering constellations:—

> An endless fountain of immortal drink,
> Pouring unto us from the heaven's brink.

At any time except in the drenching rain or blinding sleet, the mount might be worth a visit; in the season of rustic strength and luxuriance,

> When summer's hourly mellowing change
> Should blush with many roses sweet
> Upon the thousand waves of wheat
> That ripple round the lonely grange,

to the season of the year's maturity, when

> Autumn with a noise of rooks,
> That gather in the waning woods,

shall dash her fiery hand through the foliage, and leave on the scorched and flaming boughs the concentrated glories of the sunsets of a year.

> In this retreat,
> Immantled in ambrosial dark,
> To drink the cooler air, and mark
> The landscape winking through the heat,

would be to realize for an hour at least the poetical idea of "sweet dreams, health, and quiet breathing;" an enjoyment that never yet was found to unfit either man or woman for the more serious duties which engage so large a portion of our lives.

A SELECTION OF TREES AND SHRUBS FOR ROCKERIES.

For very dry elevated positions the most useful deciduous trees are Thorns, Caraganas, Halimodendron argenteum, Kolreuteria paniculata, Althæa frutex, Euonymus europœus, Gleditschia horrida, Ornus europœus, Pyrus aucuparia, Rhus cotinus, Rhus glabra, Rhus typhina, Robinia pseudo-acacia.

The evergreens most likely to thrive in dry elevated sites are common Box, Holly, several species of Cistus, Cotoneaster, Grevillea rosmarinifolia, Rhamnus latifolius.

A SELECTION OF ONE HUNDRED ALPINE AND HARDY PERENNIALS SUITABLE FOR ROCKERIES.

Achillæa millefolium rubra, Alyssum saxatile compactum, Andromeda hypnoides, Androsace carnea, A. ciliata, A. lactea, A. obtusifolia, Anemone vitifolia, Antennaria tomentosa, Arabis albida, A. lucida variegata, Aretia vitaliana, Aubrietia Campbelli, A. deltoidea grandiflora, A. purpurea variegata, Campanula aggregata, C. alpina, Cheiranthus alpinus, Chimaphila umbellata, Cistus formosus, Cyclamen coum, C. græcum, Dianthus alpinus, D. cæsius, D. glacialis, Dictamnus fraxinella, Erigeron speciosus, Eritrichium nanum, Euphorbia Portlandica, Gaultheria procumbens, Gentiana acaulis, G. Andrewsi, G. angustifolium, G. bavarica, G. ciliata, G. verna, Helianthemum formosum, Hepatica angulosa, H. triloba, (in its several colours of blue, red, and white,) Hypericum calycinum, Iberis carnosa, I. gibraltarica, Iris fœtidissima variegata, Linaria alpina, Linnæa borealis, Linum alpinum, L. flavum, Lithospermum fruticosum, Lychnis alpina, L. viscaria flore pleno, Lysimachia nummularia aurea, Mimulus cupreus, Myosotis dissitiflora, M. rupicola, Oxalis tropælioides, Phlox Nelsoni, P. frondosa, P. verna, Polygala chamæbuxus, Polygonatum roseum, Polygonum vaccinifolium, Primula acaulis (in variety,) P. cortusoides amœna, P. farinosa, P. purpurea, Saponaria cæspitosa, Saxifraga aizoon major, S. cordifolia, S. cotyledon, S. hypnoides minor, S. oppositifolia, Scilla amœna, S. bifolia, S. siberica, Sedum acre aureum, S. glaucum, S. fabarium, S. hirsutum, S. purpurescens, S. sempervivoides, S. virescens, Sempervivum californicum, S. montanum, S. tectorum, Silene Schafta, Soldanella montana, Spiræa filipendula pleno, S. ulmaria variegata, S. palmata, Thymus azoricus, Tritileia uniflora, Tussilago farfara variegata, Veronica saxatilis, V. dentata, Viola cornuta, V. lutea grandiflora, V. pedata, V. suavis The Czar.

GARDEN AQUARIUM, AND WATER SCENERY.

At the foot thereof a gentle flud
His silver waves did softly tumble downe,
Unmarred with ragged mosse or filthy mud;
Ne mote wylde beastes, ne mote the ruder clowne,
Thereto approch; ne filth mote therein drowne:
But nymphes and faeries by the bancks did sit
In the wood's shade which did the waters crown,
Keeping all noysome things away from it,
And to the waters fall, tuning their accents fit.

SPENSER.

THE Romans delighted in their fish-ponds not so much as ornaments as preserves for epicurean delicacies. The lampreys were their water-gods, which, as in the case of Hortensius, they alternately petted and adored, and to whom they now and then sacrificed a human victim, not to appease the anger of the deities, but to satisfy their appetites, and improve them for the table. Our English fish-ponds and aquaria bring suggestions of a more domesticating character, in unison with our national feeling and love of rural elegance. Water is the life and soul of a garden, whether on the ground-plot of a suburban cottage, or the embellished lawn of an extensive villa. It can

be rendered appropriate to any style of gardening, and is equally adaptable to the classic refinement of Italian terraces and gay parterres, as to the shrubby umbrage of a rustic wilderness.

We will venture to say that water is rarely used to such an extent as it might be, and should be, in English gardens. Frequently the abundant supplies of water on an estate are looked upon as a calamity; the owner frets himself to find outlets, the legislature comes to the rescue with a drainage act; and oftentimes when the drainage has been effectually diverted away from the place, it is discovered that it might have been put to better use than to swell the woodland rivulets and add to the volume of a stream which contributes to the wealth of lands miles away by means of many such contributions. We call to mind a property we were engaged to lay out not many years since, and where we were permitted to indulge our taste freely in forming a beautiful scene. While scheming to carry water away from the land, and carrying out great drainage works for that purpose, the engineers were at work on the highest part of the ground boring an artesian well. Every one to his trade, the landscapist must drain, drain, the engineer must bore, bore; one is getting rid of the very element the other seeks, and the proprietor who pays for the work simply occupies the position of a means of separation between agents who ought to work together, and according to one plan, from the first. It is true that land needing drainage must be drained; it is true that water stagnating in the soil is like so much poison; but having once persuaded that water to move in channels provided for it, having guided it into small pipes, and thence into large mains, and thence into lakes, ponds, and outlets, ought we to dismiss it at the boundary, lose it for ever, while the domestics are perhaps crying out against the scanty water supply, and the proprietor contemplates sinking another well in hopes of the second being less intermittent than the first? Generally speaking, the economy of country houses in respect of water may be likened to the act of a farmer who should pay fifty shillings a quarter for imported wheat, and, at the same time, give the produce of his own farm to the fowls of the air, and yet, after all, should persevere in growing wheat, that he might continue to waste it in the same manner.

It is said that all possible ranks of industry are filled up, which is equivalent to saying that human invention is exhausted. Having made this quite superficial remark on the paradoxical management of water on landed properties, it must be further remarked that there is ample room and verge enough for any thoroughly competent and ingenious person to make a fortune by the

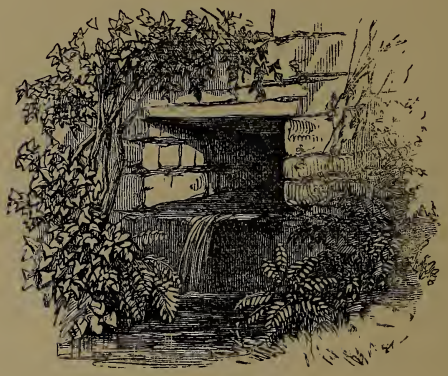
establishment in country houses of economical water-works. In many private houses small gas-works are in operation, but there are many substitutes for gas, and there is no substitute for water. When you have a great supply of water by surface drainage, the only question of its conversion to tank water for domestic purposes is one of pure mechanism, and a mere beginner in engineering could devise plans for the appropriation of every drop at such a comparatively low rate of cost as should, in many instances, render well-sinking and boring most ridiculous.

Let us suppose a property to be completely drained, it is a mechanical matter to collect the water somewhere; a mechanical matter to take it from thence by means of the hydraulic ram to any higher level if there is anywhere near a moderate fall, whether natural or artificial. Even the water used to afford mechanical power to the ram need not be wasted; and, having got a ram to work, the water may as well be carried to the top of a house or the top of a hill or tower, as to any level midway between such extremes. The next business is to make this water subservient to utility and ornament at one and the same time. The quantity which can be kept flowing, and the volume of the reserve, on which the works will have to rely during a long drought, must to some extent determine the nature of the ornamental purpose to which the water may be applied; it may sometimes furnish a cascade, and send silvery spray through a rocky glen clothed with myriads of mosses and ferns, or furnish a little spring or fountain to splash over a stone into a nook full of freshness, and thence flow to the lake again, or to fill the tanks which supply the garden.

> And, me before, I saw a little well
> That had his course, as I could well behold,
> Under a hill, with quick streamis and cold.
>
> The gravel goldn; the water pure as glass,
> The bankis round the well environing,
> And soft as velvet was the younge grass
> That thereupon hastily came springing.
> The suit of trees, abouten compassing,
> Their shadow cast closing the well around,
> And all the herbis growing on the ground.

It must never be forgotten that the disposal of water-scenes demands the exercise of great taste and judgment. Water of itself is always beautiful,

but its association with objects of interest enhances its beauty, and supplies also the justification of usefulness. Where the space and circumstances admit, water should always be enriched by plantations; clumps of trees, rustic buildings, rockeries, and belts of shrub are appropriate accessories; but they must be adapted in style to other surroundings, and the general character of the place; and there is a certain point at which to stop in the work of embellishment, or the whole affair may be overdone. Architectural fountains and the accessories of terrace water-works may be complicated and elaborate, but whenever water is allowed to expand to show its gleaming surface beside green turf and trees there must be *breadth;* the eye must be free to range in some one direction over lawns or other open spaces, in order to render



the thickening of sylvan scenes and the confusion of bush and brake the more agreeable where the water is conducted away from the dressed grounds and made subservient to true rusticity. What a charm would be imparted to many a garden where a still pool, "mantled o'er with green," reproaches the proprietor with neglect, by the introduction of a clump of trees and a garden-house, or by the appropriation of one bank to a bee-shed looking south, and a summer retreat in the rear, facing in the opposite direction, where the bees would neither harm nor alarm anybody. Picturesque objects in the vicinity of the water double themselves on its surface, and the shadows and reflections are alone sufficient compensation for the cost of the work when the arranging and grouping have been managed with taste.

Water may be introduced in any part of a garden or wilderness; but the *way* in which it is done must be determined by the nature of the locality. Suppose the possessor of a garden wishes for water at the summit of a hill, then if he would have a pond or a lake, the chances are in favour of the affair becoming a source of merriment to critics of landscape. But a bubbling fountain would be very appropriate to the top of a hill; and not long since we sat beside a crystal spring on the brow of a heathy eminence at Oakshott, in Surrey, and counted the species of plants the water had coaxed there. Natural springs frequently emerge on high grounds, and in a grand garden the charm of a fountain on the side or summit of a hill may be made quite appropriate, even if the water supply for it has to be secured by artificial appliances, such as the working of a ram at some distance off, and the conveyance of water to the spot by pipes under ground. Once get the water up there, provide a stone receptacle for it, and lead away all overflow in the form of a rivulet, and nature will soon plant the margins of the fountain and the rill with curious wild flowers, and the birds of the district will make the spot a favourite haunt for bathing, drinking, courting, and of course for morning and evening concerts. The fountain on the hill at Oakshott flows over a rough oak cistern, fixed there by the villagers to preserve a depth of water for dipping. It is almost hemmed in on three sides with tangled vegetation, most of it lovely and rare, and the shallow rivulet it makes in its course down the hill is completely matted with sundew, lichen, lycopodium, scutellaria, bog pimpernel, and other of the choicest vegetation of heathy bogs. If it could be transferred with all its accessories to some great garden it would be considered one of its choicest features, and perhaps attract more visitors than it might be convenient to admit gratuitously. One who would have water at the top of a favourite mound must be content with a rustic fountain, and indulge fancy to any extent to make it grotesque, picturesque, or severely simple.

In the main walk water is equally admissable, but then we must have an achitectural fountain or basin. The style of the house, the terrace, and the grounds must determine the style of the fountain. If the house is a very plain edifice, and the grounds would need to be described as "neat" rather than "grand," we should prefer a plain stone moulding, a few graceful curves, and trust more for effect to the sparkle of the water and the grace of the accompanying vegetation than to sculpture or fanciful rockeries. A fountain in a main path, within view of the drawing-room windows, or readily accessible from

the house by a short walk, should certainly present itself to the eye in a very distinct form, and should constitute a feature in the scene. If so small as to be invisible until the visitor almost tumbled into it, and so mean in character as to have no more dignity than belongs to an accidental detail, every person of cultivated taste would condemn it as an absurdity. If too grand for the place it would be equally absurd; in fact, if it cannot be well done, as circumstances require, it should not be done at all, for paltry waterworks are more obnoxious than paltry earthworks, and betray more quickly whether lack of means or lack of taste is to be accredited with the failure.

Rustic waterworks may be introduced in rustic scenes very appropriately, but to dispose rustic forms and proportions with propriety and effect demands quite as much taste and judgment as the plan of a grand architectural fountain. If a supply of water can be obtained for a portion of the ground appropriated to ferns, rockeries, and green recesses, it can be made much of, both for the greater display of the sparkling stream and for assisting such of the plants as require it, by leading it about in the form of a rivulet down a succession of cascades, terminating in a rocky pool at the outlet, and this rocky pool may be made bewitchingly beautiful by planting it with burr-reeds, flowering rushes, lady ferns, osmundas, arundos, and other elegant aquatics. Happily for the possessors of villa gardens there is no need to call in an architect or engineer for advice on any waterworks of moderate pretensions, for the fitting of a fountain, according to the laws of hydrostatics, is a matter within the capacity of any respectable plumber, and the ornamental work may be obtained in imperishable stone, in any and every style, from the most severely classical to the most grotesquely rustic, and sheets of patterns may be obtained through the post by asking for them, and supplying a stamp to frank them through.

It may be well here to say, that for a fountain there must be a reserve of water at a higher level than the fountain itself. In towns this is easily accomplished by constructing a cistern in some elevated part of the residence, and securing a supply to it from the ordinary water-pipes. Then from the cistern there must be another service to the fountain. If the house is far removed from the fountain, it will be better to place the cistern on the summit of a tower, shed, summer-house, or other structure, as the longer the supply-pipe the more will the play of the fountain be lessened by friction; for though water will always rise in a pipe to the level of the point of departure, it requires time to do so, and friction reduces the rapidity of the flow, and hence the force with which a fountain will play cannot be deter-

mined solely by the difference of altitude between the jet and the cistern. If the supply-pipe is one hundred yards in length, the height of the fountain will be reduced one foot below what it would attain if the supply were close beside it. Suppose that, according to the respective levels of the jet and the cistern, a fountain ought to rise ten feet, we have only to remove the cistern to a distance of one thousand yards to nullify the whole effect of the descending force of the column of water, and, consequently, destroy the jet altogether. To determine the adjutage is easy enough by experiment with a leaden nozzle, which can be pressed or opened to the dimensions found to suit the circumstances, and this course is absolutely necessary where the engineer has no ready means of ascertaining the power of the head. As a rule, the adjutage, or opening of the pipe, should be one fourth the size of the pipe itself, but every fountain should be supplied with a series of adjutages to produce different forms of jets, as the force of the head may vary, or as the caprice of the possessor may determine.

To increase the force of a fountain it may be placed at a comparatively low level, yet the lower the level the less is its dignity, and it is generally much better to adapt the head to the level than the level to the head, for a fountain constructed with taste is too expensive and important an affair to be placed anywhere but in a conspicuous position, that is if it is to form any part of the garden scenery. Once set the stream flowing, and it may be turned to many uses after it has splashed and glistened in the form of feathers, baskets, parabolas, and true lover's-knots; the outflow may be arrested at points where water is required for strictly horticultural purposes, to save that everlasting fetch-and-carry which is the bane of many an otherwise good garden, and after that the wilder parts of the ground may have the benefit of a rill where water-cresses would grow and the robins would wash themselves.

There is only one position proper for a pond in a garden, and that is somewhat remote from the house, and on the lowest level of the place, where it will naturally receive much of the rainfall. A pond is a miniature lake; it must be in the natural style, no matter what its size or shape, and hence costly architectural accessories are not needed. In choosing a site for the pond, give preference, if possible, to a position where two or more walks meet at the junction of the dressed grounds with the wildest portions of the scenery. In marking out the boundary, throw the greatest extent right and left of the principal approach to it, or the principal view of it. Suppose, for instance, that the walks lead from the terrace or dressed lawn through a belt of evergreens towards

the wilderness, at some point in this progress the pond will appear in the scene; and on the side next this approach it should be so extended as to show the greatest possible extent; and the whole of the planting of a nature to obstruct the view should be on the margin most remote from this first and principal view.

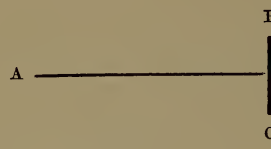


Fig. 1.

Fig. 2.

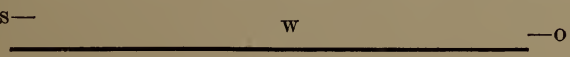
Suppose our principal view is from A (Fig. 1,) which we will consider to be the site of an elevated part of the lawn, to which we resort for a view of the country. If the pond extends its greatest diameter from B to C, the eye has the fullest range of its boundaries—none of its extent is lost. But suppose the longest diameter happens to be as in Fig. 2, then, however spacious the extent of water, it is foreshortened to the eye, and appears smaller than it really is. But to destroy the severe formality of right angles, the general direction of the foreshore may be oblique to the line of vision, without loss of space, provided the obliquity is not at a low angle, and the form of the whole is irregular. This may be illustrated by a sketch from a pond made by us, a few years since, in a garden in a very pretty western suburb. Instead of a circle or a square, we bent the pond round upon itself, so that the whole extent cannot be viewed from any one point. The margin next the principal view was left quite open, so as to allow the whole of the surface of the water to impress its character on the scene. The planting on the open side was arranged so as to partly obstruct the view of the distant village, which now appears as if set in a frame-work of leafness.

It is needful that a few practical remarks should be made in reference to the earth-work of a pond. When the site, size, and shape of the pond have been determined, a dead level must be marked on stakes placed at a few points of the boundary, and to this level all work must be regulated, no matter what the intended depth, or what the variations of that depth in different parts of the same pond. We can illustrate the necessity for making a dead level by a case that lately came under our observation. A landscape-gardener marked out a place for a pond in a very pretty place he was engaged in planting and decorating, and the superintendent of the works, a man well experienced in

every branch of horticultural industry, trusted to guess-work instead of using a spirit-level in taking out the stuff for the pond. The result was, that when the first heavy rainfall came the pond filled, and was about one inch deep at one end and five feet at the other. It had to be emptied, the outfall pipe raised, the bottom lowered, and the whole of the banks lowered from nothing at the deep end to five feet at the shallow end, which you may be sure was a much severer task than first lowering it properly would have been. Suppose the workman makes an excavation, if he is working to a dead level, and the result is the line A B. Now let the water into the pond, and the result is

the line C D. Under some circumstances it would appear as if the water in this case lay all aslant. This necessity for a dead level is a separate affair altogether from the scenery of the banks; for the banks may rise into knolls, steeps, mounds, or what else, with the greatest propriety, and, in fact, it adds very much to the beauty of a sheet of water if it is enclosed on one side by shelving banks and rising grounds; but these may all be considered in the first instance in relation to the dead level, which the water will always present, and the excavation for a pond must be conducted with a view to that dead level from beginning to end.

Another matter calling for remark is, as to supply and waste. If placed in the lower part of the grounds at the time the drainage is effected, all the drains can be made to converge to one main, which will convey the water to the pond. The outflow should be on the opposite side, to convey the water to a lower level. The level of the water will be determined by the position of O, the outfall, and this will be determined by the highest point to which the



supply S can be carried, and this highest point must of necessity be the lowest in the whole set of drains in communication with S. The larger the pond the greater must be the difference between the level of the supply S, and the outfall O. If these approximate too closely to a dead level, then the flow will be so sluggish that the water will soon get foul. There is always one resource available for remedying defects of level or supply, and that is, to raise or depress

the outfall, so as to quicken or slacken the flow of water towards it, and to secure the possibility of altering the outfall at any time there should be a quick fall from the outlet to the drains, brooks, and ditches that are to receive the waste.

Wherever a natural stream flows through the grounds with something of a pace, a pond or lake may be obtained by the simple process of making a suitable excavation, and checking the flow of the water by a dam formed of stone or brick. First divert the stream if the pond is to occupy a position in its natural course, if not, let the stream flow in its wonted channel until the

Rustic Boat-house.

new channel is ready for it. Then make the excavation, and have it well puddled if the ground is of a nature to require it; generally speaking, puddling is unnecessary, for though the water may filter away for some time, the deposits of one season will usually suffice to render the bottom comparatively impervious, and the water will then keep to its proper level. One of the finest pieces of ornamental water in the country, the great lake at Sherborne Castle, affords a good example of this simple method of treatment, for it is nothing more than a natural stream dammed back; the work of one of the greatest landscapists this country has ever produced.

To obtain picturesque effects in connection with water scenes, is one of

the easiest things in all the range of garden embellishment. The water is always our friend, its gleaming silvery surface when the sun shines, and its deep indigo, or sea-green colour under a dull sky and with a breeze troubling its surface, render it so pleasingly contrastive to all possible surrounding objects, that we may almost declare it difficult to spoil a water scene. But of course there are limits to our choice of accessories, there is a good and a bad taste in these matters, as in all else, and appropriateness

Rustic Fishing-house.

must be studied. Here are two suggestive sketches of the most simple nature. One is a copy of Cotton's Fishing-box near Hartington-on-the-Dove, which we adopted in the embellishment of an island on a good fishing stream in the grounds of an employer; the other is a boathouse, which has no merit of design, but is placed in just the right spot to render it appropriate and picturesque.

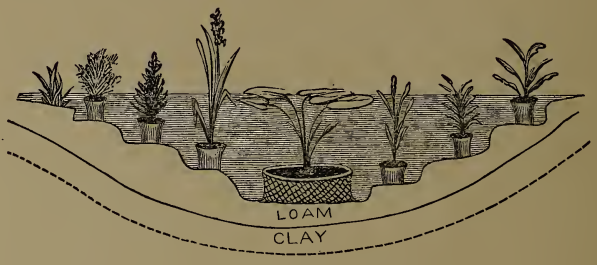
According to our rule of considering small things equally with great, we will now describe a well-kept suburban garden of small extent, the hobby of a respected friend; the length is little more than one hundred and fifty feet, the breadth forty. From the drawing-room and study windows we look down on the out-houses auxiliary to the kitchen. These are covered with ivy and clematis of many years growth, and boil over at all corners with huge tangled masses of glossy foliage, and interlaced branches. One the right hand, starting from beneath the roof of clematis, runs a close mass of evergreens, which forms a border winding by a bold curve to a series of flower-borders and parterres. On the left, the garden-wall is covered with old jasmines, almonds, pyrus, clematis montana, ivy, and creeper-vine. The border under this wall consists of a few small evergreens, many of them rhododendrons, and before these stands a row of dwarf roses, with shrubby perennials between them. In the centre runs an oblong parterre, studded with bright flowering perennials in large groups of contrasting colours. The path runs on each side of this centre-bed, bounded on the right by the border of evergreens, on the left by the roses and perennials. Where the paths meet at the further end of the central bed stands the fountain, the path encircling it, and then passing on down both sides of the garden, where the shrubs thicken and at last terminate in trees, with woody country scenery beyond the garden as a background. We describe details not because they are uncommon, but because the fountain is the key-note to the whole, when placed and arranged as this is, and the result is a complete picture.

The stone basin is about ten feet in diameter; around it is a ring of rock-work, or, to speak more correctly, dark stones, studded with the choicest collection of British plants ever got together in so small a space; a mass of dark green juniper forming a rich clump of overhanging verdure, that serves to break the formality of the circle, and adds, by contrast, to the beauty of the brighter foliage, and gay mingling of colours in the succulent and trailing plants with which the remainder of the ring is thickly studded. A light wire fence surrounds this beautiful garland, and beyond this is a broad circle of the greenest sward, adorned with a fine group of standard roses, each of a distinct and bold tint, the heads of all being trained out fountain-fashion. In the centre a bold jet plays: it is supplied by a cistern, elevated and hidden by trees. This scene from the windows of the house has a charming aspect, and every one of the many fine clusters of colour in the surrounding borders derives additional glory from the vivid green of the zone of turf, and the sparkling

DESIGN FOR GROTTO FOUNTAIN.

freshness of the water, with its groups of lilies, cape pond-weed, and trumpet-lily, and its stock of lively gold-fishes.

A garden of the smallest dimensions affords facilities for the introduction of water scenery of this kind. A basin of artificial stone is to be preferred where the dimensions are small, and the formal arrangements of the flower-beds such as to render a rustic pond out of keeping with the scene. Such a tank must not be enclosed by shrubs or a profusion of vegetation, but must offer its white rim in contrast with a smooth turf, sloping gently up towards a hillock, out of which the basin rises with its circle unbroken, or only broken in one or two places by an elegant trailing plant or piece of appropriate statuary. In such cases the surrounding borders should be formally laid out with gay flowers, the box, or, still better, stone edgings kept in the neatest trim, the standard roses on the turf few but fine, and anything in the nature of a shrubbery or sylvan retreat, placed sufficiently far away as not to break the formality



and brightness which should surround the basin. The fountain may be of a classical design, a mere jet on the surface of the water not having sufficient dignity, while the ornaments of the walks and grass-plots should be elegant vases crowded with gay plants, and light iron chairs, rather than rustic baskets and mossy seats.

In the formation of a small pond for the cultivation of aquatic plants the following process may be adopted with advantage:—A concave hollow must be dug of the necessary dimensions, sloping steadily from the outer rim to a depth of not less than four feet in the middle. Over the bottom must be placed a layer of puddled clay, of the thickness of from six to twelve inches; above the clay a layer of rich sandy loam, or well-tempered soil from the bottom of a pond, must be arranged in circular terraces, like the seats in an amphitheatre,

so as to form a series of shelves of various depths, from the margin to near the centre. On these shelves may be planted the aquatics which are intended to be grown in the water. The advantage of a descent by a series of steps, instead of a regular slope, is that you may place pots with plants at various depths, so as to submerge each sufficiently, which you could not do on a slope; the pots being of course removable at any time, for renewal of plants, or during severe weather. This form of bottom also affords the best possible

Design for Rustic Fountain.

facilities for repairing or altering the arrangements of the plants; they are readily accessible, and exotic aquatics, grown in pots, may be immersed during summer at the several depths which they require, and removed back to the house during the severity of winter.

As no one would desire to fill a pond with pot plants, the bed of loam overlying the puddling affords abundant root-room for strong-growing plants. In the cut is shown a water-lily in a basket; this being the readiest mode of introducing this queen of the waters, for it is fixed in the first instance where

required, and in time the basket crumbles away and the roots spread, and the plant obtains a fixity of tenure.

Stone is unquestionably *the* material for fountains, but its cost precludes any extensive use of it, and the best substitutes claim a moment's consideration. There are several kinds of artificial stone in use for garden embellishments;

Design for Classic Fountain.

and these being well adapted to the purpose have done very much towards the revival of classic taste in gardening, by placing within the reach of many who could not aspire to the luxurious marble and porphyry of the old princely fountains, a material in every way suitable by its durability and cheapness, even when wrought to forms of high art, and its perfect resemblance to stone. The

best designs have been sought, and well worked out, for fountains, statues, vases, and groups of objects of various kinds, and these form valuable accessories to an ornamental garden. Iron is not only more capable of assuming graceful outlines when fused into well-designed moulds, but it bears exposure to the weather for any number of years without deterioration, if painted once in two or three years; it is not liable to chip, as most real and some few artificial stones are, and generally the cost is lower than artificial stone of any kind. Nevertheless iron is not stone, and must ever depend for its capability of imitation on paint, which precludes the possibility of weather stains and that mellowing of colour which stone acquires by long exposure to the atmosphere.

The annexed design for a fountain, consisting of a group of Tritons supported by dolphins, in a basin of the old French school, might very well be worked out in artificial stone. It should be produced on a somewhat large scale, to tell with effect in the scene, and is, of course, only adapted to the terrace of an Italian garden, or to form a centre to a series of brightly-coloured parterres or grass-plots broken by flowers. In a rustic scene it would be inappropriate. The artist has carried the outer jets too high; if they had but half the height given them in the engraving, the summits of the several jets would form a pyramid, and give much more grace to the *coup d' œil* than it has at present.

A SELECTION OF TREES FOR WATER SCENES.

Nearly all large-growing hardy trees thrive in the neighbourhood of water, although it is not so stated in the books. But for positions commonly too moist for a large selection, willows, birches, alders, and elms are the most useful. Of willows the most ornamental are *Salix americana pendula*, *S. babylonica*, *S. caprea tricolor*, and the Kilmarnock willow. All the birches are beautiful, but the most choice are *Betula alba pendula*, *B. papyracea*, *B. nigra*, *B. rotundifolia*. Amongst the alders, the best are *Alnus glutinosa aurea*, *A. g. laciniata*, and *A. montana*. The common elm need not be named here, as it is well known as one of the grandest of forest trees. But the Camperdown elm, *Ulmus campestris camperdown*, and the twiggy elm, *U. c. viminalis*, are less known than they deserve to be, considering their beauty. The common hydrangea attains to magnificent proportions in the neighbourhood of water.

A SELECTION OF HERBACEOUS PLANTS ADAPTED FOR WATER SCENES.

Acorus gramineus, Arundo donax, Caltha palustris, Carex maxima, Comarum palustre, Cyperus longus, Epilobium angustifolium, Iris pseudo-acorus, Juncus effusus spiralis, Limnocharis Humboldti, Lysimachia thyrsiflora, Lythrum salicaria, Menyanthes trifoliata, Nuphar lutea, Nymphæa alba, Poa aquatica, Sagittaria patifolia flore pleno, Sparganium ramosum, Typha latifolia.

Corbel Fountain.

THE SUMMER HOUSE.

Oh! by yonder mossy seat,
In my hours of sweet retreat,
Might I thus my soul employ,
With sense of gratitude and joy,
Raised, as ancient prophets were,
In heav'nly vision, praise, and pray'r,
Pleasing all men, hurting none,
Pleas'd and bless'd with God alone;
Then while the gardens take my sight,
With all the colours of delight,
While silver waters glide along,
To please my ear, and court my song,
I'll lift my voice, and tune my string,
And thee, Great Source of Nature, sing.

PARNELL.

SUMMER-HOUSES of some sort are desirable, and indeed almost necessary features in gardens of all dimensions and styles. Indeed, the grander the garden, the greater need for places of retirement, for rest, shelter, conservation, and sometimes for that blessed change "out of the house" which comes over every one of us at times,

when the air is balmy, the trees leafy, and the routine of domestic life a little tame or wearisome, as it will be on occasions in the best-regulated homesteads. The subject cannot well be kept within a narrow compass, but we shall take care to say only a small part of all that will occur to us as we go on, for to deal with it thoroughly we should need hundreds of pages and thousands of designs, and a few years of luxurious leisure to bring our ideas to a measureable focus. "We aim above the mark to hit the mark," says Emerson; be it ours, in this short essay, to aim below the mark lest we hit it too hard, drive it into illimitable space, and regret too late our earnestness, and abandon it. Sweet Horace gives the cue for the essayist of the moderate persuasion—

Pindarum quisquis studet æmulari, etc.

Summer-houses, good friends, may be regarded as simply useful, as simply ornamental, or as combining both these qualities. Our own peculiar idea about them is that if they are not useful, they are but as stored up firewood, no matter how beautiful in appearance, or how much they may have cost. To begin with the most obvious uses, a summer-house should be adapted for rest, shelter, meditation, conversation, reading, observation, and perhaps conviviality.

Our own out-door sanctum serves all these purposes, and more. For very many years past all our literary work—and it amounts to something as the year runs round—so long as weather permitted has been accomplished in a summer-house, and we are now building a little cottage by the side of a stream in a grass field, on a spot shaded by a glorious clump of trees, wherein there will be accommodation for a few hives of bees, with a snug room set apart for books, papers, gossip, the fragrant weed, as an observatory too for shelter while star gazing; and as an auditorium into which the sky larks, thrushes, and nightingales will gladly "pour them vernal strains."

In this sweet haunt, thy blissful life
  Shall glide, like meadow-streamlet flowing,
Unreach'd by sounds of demon strife,
  Unknown to passion and unknowing;
For thee the fragrant airs shall rise,
  For thee shall bloom those opening roses;
Till far beyond yon trembling skies,
  Thy heart in endless peace reposes.

GERALD GRIFFIN.

Where shady trees invite the wanderer to a seat, how pleasant is it to find

the means of rest and shelter in a garden. What more delightful when the sun burns in Leo, or when the Virgin holds empire in the meridian, than to lounge in a cool shady recess, with a favourite volume and a canister of that seductive, sedative weed, which wafts us on its thin blue wreaths of smoke to the highest region of the most dreamy Elysium. The bees hum about full of business, reproaching us for the listless mood in which we watch their earnestness —everything but the bee is sleepy; the flowers nod as if napping, the air hums itself to sleep, and, lo! when we thought we were fast anchored to that favourite book, we too have drifted, like a weed upon the wave, into that tropical region where sleep, the "comfortable bird," broods "over the troubled sea of mind, till it is hushed and smooth." There is no better vindication of a summer-house than the opportunity it affords for the quiet enjoyment of a book or an afternoon nap. There are some books which seem to have been written for such reading. You could not read Herrick with such pleasure in the presence of a lamp and curtains, nor Earl Surrey, nor Jean Paul, no, nor Tennyson. Did the Laureate write the "Passing of Arthur" in such a spot; he could hardly have produced it with his feet on a carpet hassock, cramping his chest to a vile mahogany table.

Judging from the tactics of publishers, no one is supposed to read now-a-days, except when in a railway train. The quiet of a garden disposing the mind to tranquil thought, and hushing that agitation of spirit which compels us to be ever hurrying somewhere, as if we were endeavouring to escape from ourselves; —the genial tone of mind which rural scenes so happily induce, is ignored by the whole corporation of bibliopolists, and against the million of books provided for river, rail, and road, there is not the balance of one professedly for the garden or the summer-house. O, age of commercial fever, railway collision, and rotten banks; forty miles an hour is the pace of reading and travelling alike! You may plunge into a brown study while the iron wheels rattle and jar, and the engine roars you into stupidity and deafness; you may wanton in a comic novel at the very moment that a shunting coal-train is about to break your neck; but your daft purveyors of literature will not offer you one precious volume to beguile a peaceful hour amid the calm of a leafy and flowery shade. But the prodigality of printers in providing literature for travellers will not prevent the consignment of a few choice volumes to the garden house, *there* they may have a chance of being "devoured wholly," which is more than can be said for at least ninety per cent of the red, green, blue, and harlequin paper sandwiches intended to render us oblivious of elbows, noisy babies, garlic, tooth-ache, cramp, danger, and official insolence.

As to summer-houses and arbours generally, there never was so much ugliness scattered about the world as of late years has been sprinkled over suburban gardens under the vain pretence of ornament and use. The majority are like toll-houses, or beer-shops, or sweet-meat stalls, destitute of elegance, use, and propriety. A summer-house need not be utterly hidden, but it ought not to stare straight out upon us from a back wall, its ugly lattice-work without one creeping tendril to cool and comfort it, and its interior visible to every gazer, as if it were anything but a place of shade and rest. Though you never use it, it must appear fit for use, or it is no ornament. It should be well shrouded with greenery, be easy of access, sufficiently inviting to attract a stranger, yet quiet in tone, and of a chaste pleasing outline. Some of these suburban retreats look very much like the little cabins of the fly-boats on the junction canal; and one always expects to see a head pop up above them to take hold of the rudder and steer them into port. Arbours indeed! what a perversion of language, they are *h*arbours for earwigs, cats, and other vermin, not tree bowers and trellis shelters, as their philology imports.

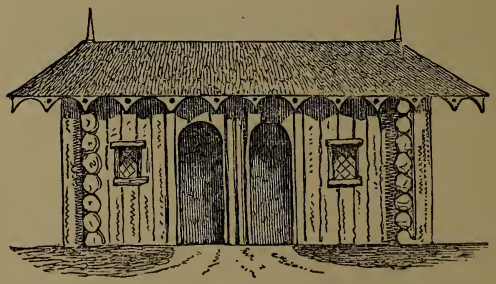
First as to the style of the structure. In respect of this matter we must be latitudinarians, and in no haste to quarrel if the dwelling-house has a Grecian frontage and the far-off garden-house is of the homespun school, showing gnarled wood supports and moss or thatch for the roof. Nevertheless a certain unity of tone in all the features of a place is desirable, and a rustic summer-house will be more appropriate in a garden connected with a rustic dwelling, than in one surrounding a grand mansion severely classic in style, with terraces, fountains, and geometric gardens. We must confess, however, that there is not much in this view of the case, as, for example—suppose a Druidic circle, or a cromlech hoary with the weather-wear of centuries, to be carefully preserved as a devout man would preserve it, on a property where the residence happens to be spick and span new, and in any very new and very sharp style that can be thought of. We should not blame the proprietor for preserving the old stones, though it is impossible they should harmonize with the mansion: nor should we blame him for adopting a modern style, which may happen to suit modern ideas of comfort, in place of the style suggested by the ancient relics. So much for the great question of propriety,—a question always worth considering; but not to the extent of making convenience subservient to extreme views on matters of taste. It is desirable, if incongruity is a necessity of convenience, that the summer-house be far removed from the dwelling and its accessories; and for the matter of that, who wants a summer-

house within a dozen or even a hundred yards of the principal entrance? All possible uses of a summer-house may be secured in every imaginable style of structure, but the rustic style is the best where the house is to serve also for bees or birds, or as a tool-house or fruit-room, both because a picturesque effect can be secured at a comparatively small expense by the employment of wood, thatch, and moss, and because, also, these materials have great protective power: as a good old country bee-keeper expressed it, "the thatch drahs the kule in summer and the wahrm in winter."

Wanting a summer-house in close proximity to the dressed grounds in a formal garden, we may easily obtain, by adapting classic outlines, a good effect and a great convenience, as in the figures subjoined. Either of these, which we shall call Grecian houses, would serve as summer aviaries, and afford suitable terminations of straight walks, more especially in gardens of limited extent, in which tasteful termini are often greatly needed. Stone, or the best substitute obtainable, is the only material suitable for structures of this sort.

Mayhap a cottage to fill up a nook amongst trees beside a stream is desirable. In a clay district "lumps" would constitute the material for the walls, and

anywhere concrete walls might be adopted. There might be one good room in which half a dozen people could take tea, (or coffee if they prefer it,) and two other rooms to serve as stores for garden seeds or tools, or for roots, or as bee-houses or curiosity shops.

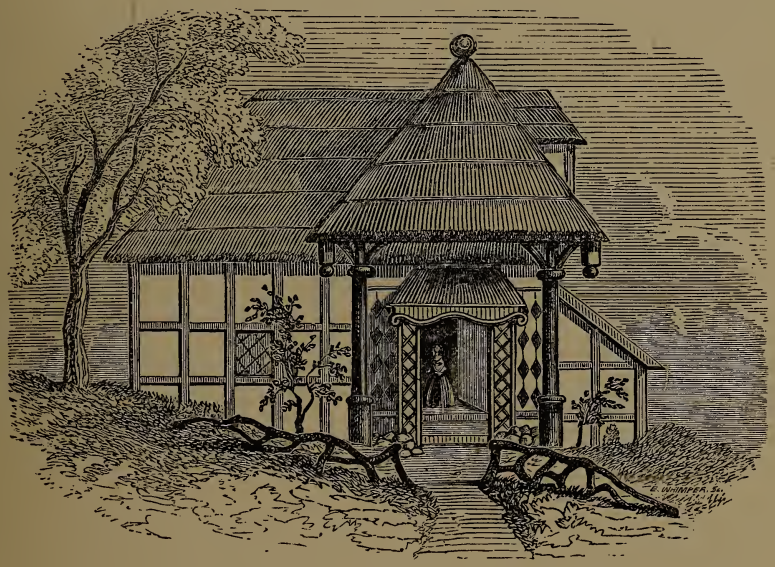


You may want a snug place next a wall facing north, rather dark, and very much sheltered from the winds and rain, somewhat shut out from inquisitive eyes, offering no attractions to strangers, and of the true hermit-cell character. Here is a design that may suit your need. You will find it rather dark at all

times, but you may, if peace and content be in your heart, find yourself immersed in a dim religious light while enjoying its restful quiet.

"Vain, very vain, my weary search to find
That bliss which only centres in the mind."

The house represented at page 367 is well adapted for a secluded spot near a stream, or on the summit of a mound in the wilderness, especially if it can be placed so as to display the whole of the frontage, which is a good example



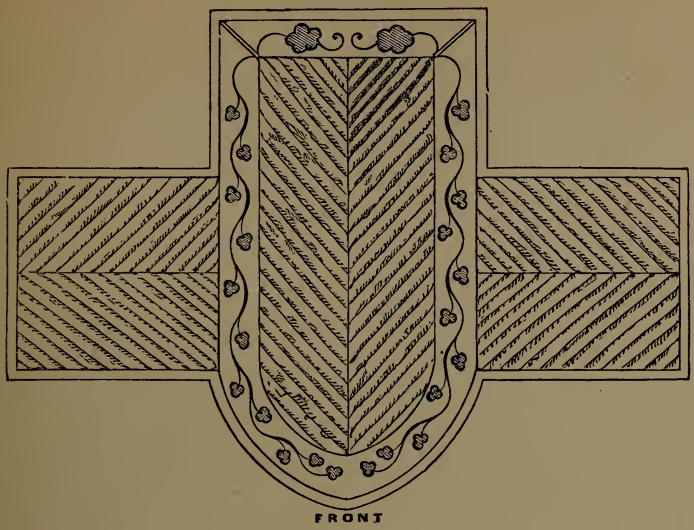
Garden Reading-room and Tool-house.

of ornate rustic. In a garden of limited dimensions the fruit-room might be constructed after this fashion, the house having double walls, a roof of reed thatch, and a cellar entered from the rear for storage of roots and kitchen fruits. A better use for it, if not needed for purposes of strict utility, would be as a museum for a collection of old china or other curiosities, in which case, to gain more light, two or three of the divisions over the verandah all round might be converted into windows. This house is twelve feet high to the

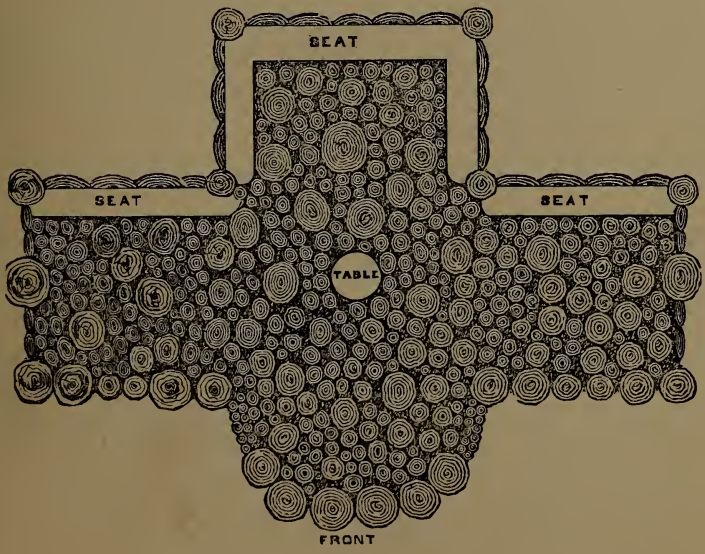
eaves, the roof rising four feet more, width fourteen feet, length about twenty feet, to afford room for a second apartment; but the building may be of any length to suit its uses and position, provided the length is not less than the width. The verandah is four feet wide, affording ample shade to the apartments, and tending to the equalization of the temperature within.

Open Summer-house for the Lawn.

Another design of the same class is here offered. The artist has been less kind than usual in giving the sketch a final touch for effect, and, therefore, we must apologize for the hardness of the ferns in front and the scrubby character of the trees behind, hoping the design may prove of practical value to outbalance the draughtsman's shortcomings. This house is adapted for a

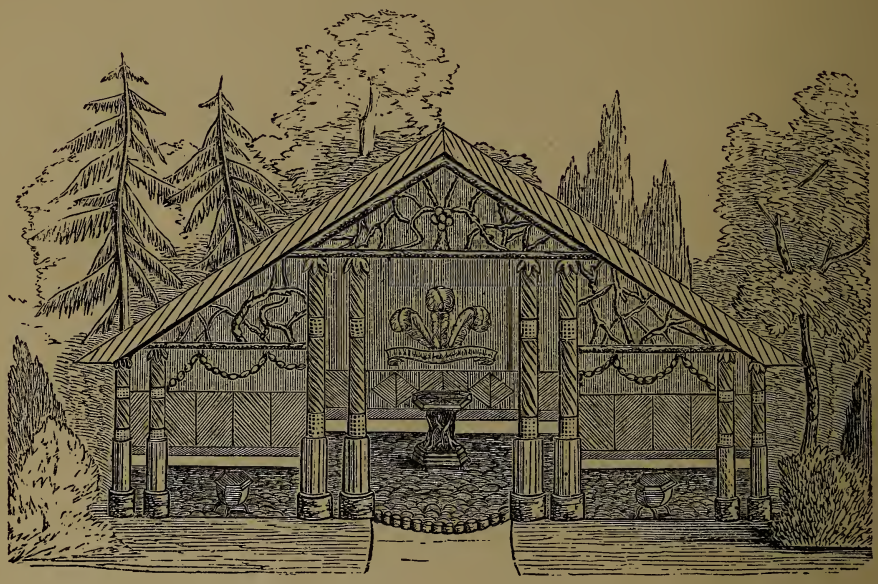


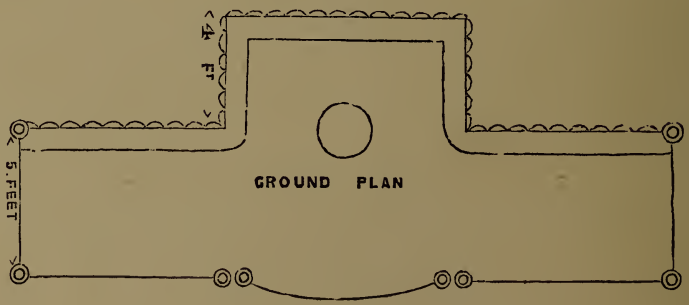
Ceiling plan.



Ground plan.

spacious lawn, to afford shelter from showers to croquet players, and for luncheon and tea parties. The angles are supported by oak or larch poles ten to twelve





inches in diameter. The back is formed of sawn poles, with a frieze of hazel rods and a square of moss-cladding on each side. The roof is thatched with straw or reeds, the latter being preferable; the ceiling is formed of split larch

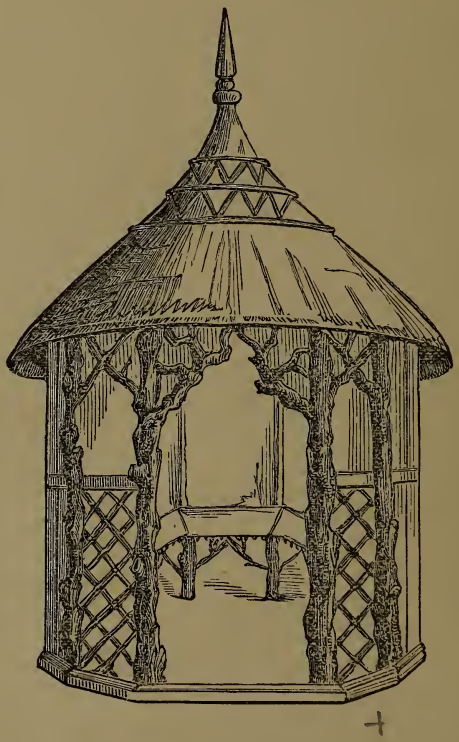
poles, bark side downward. The ceiling of the centre compartment is carried eighteen inches up the spars; below that the spars are boarded, and a moss-wreath worked upon it. The height from the floor to the eaves is eight feet, the roof rises four feet higher, the length is twenty feet. The subjoined plans of floor and ceiling will explain themselves.

The next figure is as rough as the last, but is equally practical, and represents a rather fantastic open house, adapted for the flower garden. The front rests upon ornamental posts, four inches in diameter at bottom, three inches and a

half at top, the shortest of them six feet long, the longest eight feet and a half. These are morticed into blocks of oak, twelve inches in diameter. The posts are first painted lead-colour, and then covered with hazel rods and cones of larch. At the top of each pillar is formed a capital of the cones of the stone pine, and festoons of cones strung on copper wire hang between the posts in front. The panels above are filled with open work of oak rongs, and the facia-board covered with hazel rods or bark. The floor may be formed

of blocks of oak or larch, or of round stones laid in a bed of concrete, the last being best adapted for a damp soil. The breadth of the frontage is twenty-two feet.

Now for a moment we will consider the summer-house purchased in a suburban wood-yard for a small garden. This is usually a badly-made and vulgar affair. It commonly has two dreadful faults—the roof shuts down close on the



walls, and when the sun shines brightly, it is like an oven, spite of the great space for air in front: and it is usually painted green; or worse, it is picked out in divers colours like poor Joseph's coat. To afford escape for heated air there should be an open space between the sides and the roof, a space of two inches being plenty to ensure a circulation of air to keep down the temperature. The side walls outside may be painted, and perhaps a dark mahogany or

purplish brown may be the best colour, at all events green is not good. As for the front and the inside, the natural colours of the woods are to be preferred before all the paints in the world. For the posts in front unbarked yew varnished is unsurpassable. Holly affords an excellent timber for supporting poles. For small lattice-work hazel rods answer admirably. It is a good plan to assist in preserving an equable temperature to line the inside with deal or oak planks, leaving a space of an inch or so between this lining and the outer wall. The lining may be stained with oak-colour and varnished, and for twenty years or more they will retain their original tone unharmed, quiet, warm, and modest. One more remark. It is prudent to place these small punch and judy sort of houses on wood sleepers, to keep them from contact with the soil, both for dryness and to retain them as "tenant's fixtures," for where houses of this kind are used, it is not prudent to plant over much in the soil for the benefit of the freeholder. The roofs of these houses are apt to become leaky after a few months of hot sunshine. Instead of the usual pitching and patching, nail down coarse canvass or sail-cloth, or felt, and on that lay a good coat of tar, and it will be waterproof for years. Stout brown paper laid horizontally, on the "feather edge" principle, forms a good under stratum for a tar finishing.

There are many modes of constructing garden-houses, as the foregoing remarks will prove, but so far as we have gone one feature is common to them, and that is that they are usually permanent structures. The beauty of our short summers is so welcome, and there is a recurring desire as the season opens in its fullness, for occasional escape from the house to a bower of some kind, that it has frequently surprised us that rustic architects do not provide for gardening folks a kind of structure that might be put together by an amateur in a few hours, and as quickly taken to pieces, and removed altogether at the end of the season. If such bowers were once fairly introduced to the gardening world, they would be gladly used as agreeable resorts for the younger members of families, where Master Tom would read Robinson Crusoe, and Miss Lucy would work in wool or lace, while other brothers and sisters would keep the flowers in trim, and so find an interest in gardening that would develope ingenuity, and furnish young minds and hands with pleasurable and educational employment.

To make a structure of this kind, the only materials necessary are a few frames of wood, and some breadths of cheap wire netting. Let there be six frames constructed of deal, each being made after the fashion of a picture-frame, but with a piece across its centre to add to its strength. The frames should be of inch-deal, three inches wide, mitred at the corners, and with the centre-

bar mitred into the two lengths. Then make seven similar frames of a triangular shape, of similar materials. The measurement might be for the larger frames six feet by three feet, and for the smaller ones three feet for each side of the triangle. Then let a double frame-work be constructed, each of seven strips of one-inch deal, four inches wide, one frame-work fitting loosely within the other, so that the six larger frames can be let into the spaces between

them. These frames will have to be made so that the strips of deal are placed on edge, leaving a slit between them, into which the inch-deal of the larger frames will fall easily. You have only to cover the six large, and seven triangular frames with wire netting, and paint the whole of a cheerful green or brown, and you have all the materials for a garden-house. Lay down the double

frame-work where the house is to stand, drop into each diagonal slit one of the large frames, and when all are inserted between the frames of the base fix them by means of a few bolts at the bottom. You will now find that you have a seven-sided erection, firmly welded together by the bolts that pass through the three thicknesses of wood at the base, the outer and inner base framing forming a beading as well as a support. Now place the triangular pieces to form the roof, fasten them and the side pieces with a few screws, and place on the summit some kind of suitable ornament.

It will look very thin and bare for a few weeks, but that is to be remedied by planting round it an abundance of quick-growing climbers; but as the house is to be removed from the scene in autumn, it will be best to use annuals chiefly, though clematis and everlasting pea may be planted, because they may be cut down every autumn. Ornaments of many kinds might be added, such as a rough lattice of barked apple-tree branches over the entrance, and around some portions of the sides a rustic mound or tree stump, with flowers or ferns near the doorway, or any other objects that would increase the beauty and add to the interest of such a garden retreat. Humble though such a home may be, its shade and shelter and seclusion may favour many an hour of happy reverie, or of social talk.

It may often happen that a summer-house should form one amongst many combined features, and indeed we have considered this case in part already. Now, however, it may be desirable to remark that the base of a water-tower, or observatory, offers a capital convenience for a garden reading room, or a pavilion for pic-nics, the coolness and shade which may be so easily secured in such a case increasing its value immensely. There can be as good reason for arranging conservatories in such a manner that they offer no temptation to quiet and rest, and are obviously intended only for the entertainment of people who "walk through." Yet amongst the plant-houses, a place might easily be provided of a nature akin to the "cool grot," wherein a *tête-à-tête* would be agreeable in the summer time, for numerous beautiful climbing plants are available to afford shade and privacy, and a green alcove might be made one of the best attractions of a range of plant-houses.

The last of the pictures in this chapter is a suggestion for a summer-house screen of a kind suitable to open the way to the rosary, or to divide the flower garden from any less important part of the grounds. This would have to be a massive construction of oak and yew, with gnarled apple tree

for the light and fanciful additions. It should be supported with good green hedges of holly, privet, or quick in the best keeping, and have the aid of a few clumps of trees to bring out its architectural features and make it look as little like a mere screen as possible.

RUSTIC SCREEN OR ENTRANCE-PORCH.

Away before me to sweet beds of flowers,
Love-thoughts lie rich when canopied with bowers.

EMBELLISHMENTS OF THE GARDEN.

This quiet garden's humble bound,
  This homely roof, this rustic fane,
With playful tendrils twining round,
  And woodbines peeping at the pane.

That tranquil, tender, sky of blue,
  Where clouds of golden radiance skim,
Those ranging trees of various hue,—
  These were the sights that solaced him.

TAYLOR'S Visit to Cowper's Arbour.

TO embellish a garden well, needs a discriminating and in some cases, a severe taste. Whatever errors may be committed in the laying out, the planting, and the disposition of colours, will more readily escape the eye or meet with forgiveness from the critic, than the injudicious adoption of any kind of special embellishment. Yet if the leading principles of gardening taste are kept in view, the smallest plot may be so ornamented as to convey an impression of luxurious completeness, and present at all seasons a wealthy fullness that shall prove its owner to be an artist in the work; and the garden of ample dimensions and varied features, will have its several beauties enhanced and brought out by exactly similar means. We do not value a picture for the extent of its canvas, but for the perfect development of its story through the medium of form and

colour, light and shade; and though artifices for concealing the dimensions of a piece of ground are, in most cases, illegitimate and unworthy, the more that ground, whether large or small, is embellished with special ornaments adapted to it and tastefully disposed, the more will its extent be really enlarged, because it will offer more and more to interest the eye, and occasion pleasurable emotions in the mind.

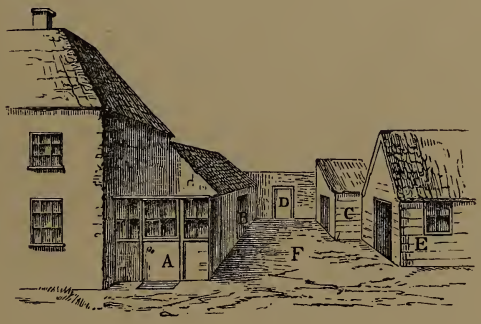
In this, as in other things, ornament may be carried to excess; yet in the higher and architectural departments excess is not so much to be feared, when we remember how lavishly the gardens of ancient times were adorned with colonnades, terraces, statues, fountains, and other productions of the quarry and the chisel; and how that same fullness of expression was sustained in the princely gardens which were the models of Italian art in landscape, and which remain to us on canvas and in books as examples of taste worthy of being copied at the present time. Excess in this department is the less dangerous, because architectural forms of all kinds suggest wealth and ease; and it is one of the tendencies of wealth to multiply these sources of pleasure, and with an unsparing hand heap up on all sides the evidences of an enthusiasm in the refining arts. Indeed when we meet with examples of excessive embellishment, it is usually of the strictly rustic class, which may certainly be most easily overdone; and an excess of rustic work anywhere betrays more of eccentricity and littleness than of a cultivated mind.

The first and fatal objection to elaborate ornamentation in gardens arises out of the fashion in which the houses themselves are built; for the garden begins at the garden door, the house is an integral portion of the whole scene, and except the princely mansions that melt by degrees into lawns and shrubberries, through the medium of terraces and gay parterres, the spectacle out of doors is ruined by the fact that *there* we have but a "back view of the premises."

Whatever builders may say about usage, and expense, and doing as their fathers did before them, it must be admitted that a fundamental principle of taste is violated when we give our houses handsome frontages to the public, and reserve for our own daily contemplation from the garden nothing but bare walls and plain windows, and oblique chimneys rising from a basement of ugliness. Why should the stranger see a fair exterior, and we ourselves in our privacy and home life, have to stare perpetually at outhouses, pantries, shapeless lobbies, and kitchen windows? Turn the house round then, and expose our domestic offices with the odour of our daily dinner to the streets?

No;—let the rear wall and attached offices have as much symmetry as the portico, and flight of steps, and handsome windows in the front. It is as bad as for a man to appear in society with a showy vest and faultless collar, but with soiled fustian at his back, because, forsooth, you are not expected to address him from behind, or because "a front view of the elephant" is all that is seemly.

Screens.—Where architectural beauty is fully developed, as it is in many of the mansions of our nobility and landed gentry, the construction of terraces and geometric gardens may be definitely proceeded with, but the hump-backed town houses admit of artistic embellishments very unkindly indeed. What is to be done for them? Sometimes the builder, for an additional outlay, will construct a balcony terrace, opening from the drawing-room window by a glass



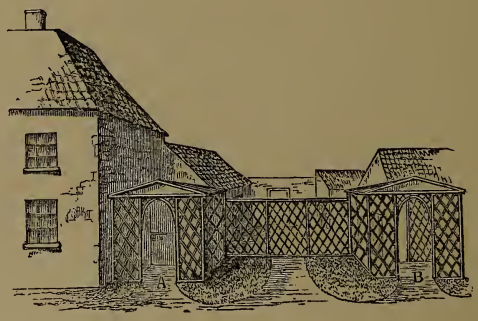
door, and leading down to the lawn by a flight of iron or stone steps. When you can have a handsome iron trellis of ornamental design, over which to carry a vine or a small collection of miscellaneous climbers, and with a few improvements above and below, taste and ease may be satisfactorily gratified, and the house fitted for the acceptance of what may be termed terrace ornaments. If the situation and character of the house does not admit of the builder's aid, refuge may be found in trellis-work, which certainly has a transforming power as effectual as Harlequin's wand, and in a manner at once simple and inexpensive.

An example of this mode of using trellis-work, is seen in the annexed sketches. The first presents us with a cluster of ugly buildings:—A is the larder, adjoining the kitchen, B a scullery, C a dog-house, D a back wall with door

leading to a lane, E a stable, and F an open space littered with straw and the results of frequent traffic between the several offices.

To change the scene, there is no need to alter the buildings, for the simplest lattice-work will effectually screen them from view without robbing them of light and air, and the lattice becomes additionally useful by covering it with climbing and twining plants.

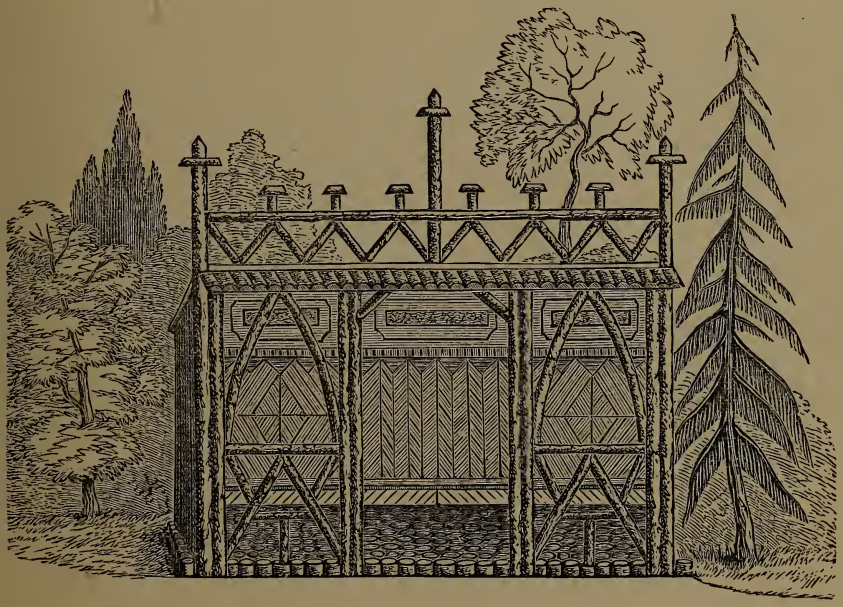
In many cases a plain neatness is to be preferred to verdurous luxuriance, yet the occasions will be few indeed where walls and trellises will not need to be covered. A neat little country box embowered in jasmine, honeysuckle, pyrus, and ivy, conveys an idea of warmth, hospitality, and homely comfort; and where a dwelling-house has not a decidedly architectural aspect, it is all



the better as to beauty and the dryness of its walls, to be well ivied and screened with greenness. Garden walls, outhouses, porticos, trellises, and arbours, all need the touch of floral grace to make them complete; and a judicious selection of such is another legitimate mode of extending your growing space and your round of pleasures.

For the fronts of houses those two commonest of screens, ivy and creeper-vine, are for general purposes the best that can be had. They train themselves; they may be cut trim, square, and sharp, or left to festoon the gables and chimneys at their own free will, and in any way are beautiful. The deep ruddy glare of the creeper in autumn is scarcely equalled by any tint of earth or sky—it is a sunset photographed. It is a matter of no small importance to adapt climbing plants to the positions they are to occupy. A few comparisons will illustrate the whole case. Search out in spring a great old wistaria

in bloom upon a red-brick wall, and the contrast of the pale blue flowers, the delicate glossy green leaves and the russet ground work, will be delightful. Now find another wistaria equally flowery, trained on a grey wall of stucco or reddish stone, and the tameness of the picture will surprise one who has never before paid attention to the subject. But if on that same red-brick wall, and on the same stone or stuccoed wall, we find six weeks afterwards a bonny breadth of Boursault roses in bloom, the tables will be turned; on the dull red ground the roses are robbed of their beauty; on the bright grey wall



they show their colour in perfection, and are as appropriate, so far as colour is concerned, as the most exacting critic could desire. It is another matter, and one of equal importance to that of tasteful adaptation, that climatal conditions should have due consideration. The lovely blue passion-flower may barely live on a cold soil in a north aspect, but the "ivy green" will not despise such a home. Roses will scarcely thrive in any aspect on a hungry sand, but cotoneaster, clematis, or creeper-vine might thrive there. We cannot pursue the subject, but these brief hints may be useful.

The best screens in all cases are those which are at once useful and appropriate furniture, and have no appearance of being screens at all. A fine clump of mixed shrubs may effectually exclude from view an objectionable scene, without suggesting to any one that its office is to hide something much more than make a display on its own account. But a belt of common laurel on the same spot will have an unmitigable screen-like look, and to some quick minds will prove as suggestive as if in its place there stood a great sign-board bearing an inscription "Please not to look this way." A rustic alcove may be made to form the termination of a view, with the warrant of usefulness to justify it. Such a little construction as the figure on page 387 represents, is also well adapted to the purpose, as it may be extended any reasonable distance right and left, and a few shrubs rising above it in the rear will effectually complete it as a block to the view, without the shadow of a suggestion of anything ugly beyond requiring to be hidden.

A collector of antiquities might extemporize a screen delightfully *negligé* and artistic, all unintentionally, by thrusting into some odd nook in the garden ancient monuments and slabs of stone, for which there could not be found accommodation in the museum. Some such effect as this, a little less classic in tone perhaps, we may see in a country builder's yard, and possibly in such a place materials towards an imitation of our own sketch (mayhap an improvement on it) might be obtained at very trifling cost. In the event of an imitation being adopted, the materials should all be copies of authentic originals, both for the sake of effect and to enable the owner to relate their history when questioned by a curious guest.

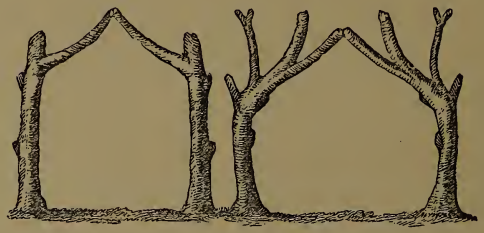
Green Arcades.—Overmuch pruning and trimming of trees results in harshness of outlines, and the inevitable deadness that accompanies tameness and sameness. It is well to see trees of distinctive habit towering up in all their natural characters without guidance or compulsion, even in the midst of the most highly dressed and formal gardens. We are no advocates for wood-chopping in general, nevertheless there are good reasons for the practice in particular cases, and by judicious clipping and pruning beautiful effects may be produced both in the highly finished and the semi-rustic scenes.

> The solemn shade,
> Verdure and gloom, where many branches meet;
> So grateful, when the noon of summer made
> The valleys sick with heat.

Where paths diverge, or where the lawn is too open, or where some distant object requires a framing as the eye falls upon it, an arch or arcade is often of great value. An embellishment of this kind may be very speedily made by means of a few stout tree loppings, the rougher and more gnarled the better; or where a couple of limes or alders stand in a position ready for the work, the saw and bill may be set to work to give them the required form, and one season's growth will obliterate any stiffness of outline that might result from a want of skill in the operation. It would be worth while in laying out

grounds to plant a few trees along the margins of walks, expressly to cultivate in this way, so as to construct natural arches, or long alleys, some object of interest being placed at the remote end, to engage the eye and entice the rambler to an inspection of it. Indeed artificial arbours might in most cases be replaced by natural ones, a little judicious pruning and leading of the trees being all that is necessary to give them any outline we may desire, though that outline should always be as simple and natural as possible. Maples, elms, chesnuts, alders, and limes, are the most suitable for such work; but you must

keep watch over yourself that you do not too readily yield to the popular love for avenues, for though these are often effective when formed of weeping limes or hornbeam, they generally consume more space than can be afforded for such formal effects. The green archway in the scene represented at page 288 consists of two thorns, which rise symmetrically and form a massive head: many a



happy day have we passed perched on a plank on tall trestles clipping them to form a handsome crown.

There are many ways of leading and pruning to compel trees to span a walk, or form a leafy roof to cover a rustic seat. Who does not prefer a seat under a tree,

Shaking its million leaflets in the sun,

to one in the confined air of a close timber box, yclept a summer-house? Here are four examples of this mode of planting and lopping in the construction of natural arbours, whence, by the shortening of the leaders, a vigorous side-growth of the laterals is induced, a roof of greenery is soon formed, that not only excludes the "sun's perpendicular rays," but gives shelter during the

heaviest summer showers, so that in changeable weather the enjoyment of the garden is not cut short by a flight to the house, or made irksome by the carrying of umbrellas.

These arcadian shades are more appropriate positions for rustic seats and resting-places than open lawns or orderly paths. Not but that a seat may often be well placed as an ornament in any spot where it may prove useful as a place of rest and gossip, and sometimes as an invitation to the enjoyment of a view; yet as a rule a rustic shade is the best position for a rustic seat; it

looks useful and appropriate there, and may be embellished with a few rough stones, planted with ferns or other plants that like shade, or a couple may be placed one on either side of the bole of a large tree, and the spaces between them filled up with large root stumps, profusely planted with ivy, periwinkle, toadflax, orchises, and ferns, and a truly rustic and beautiful retreat will be formed without the introduction of a single element that would interfere with the general tone of the landscape, as a summer-house or grotto frequently will do.

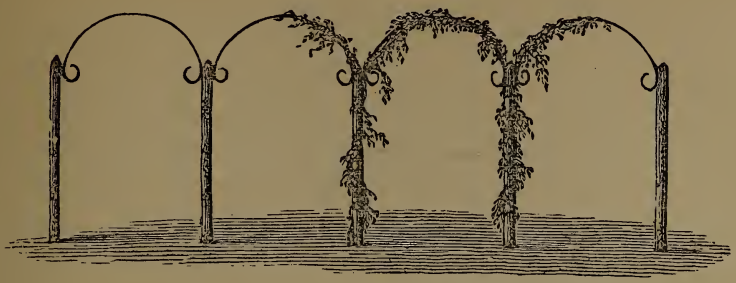
Another kind of arch is that formed of dead timber, the materials being

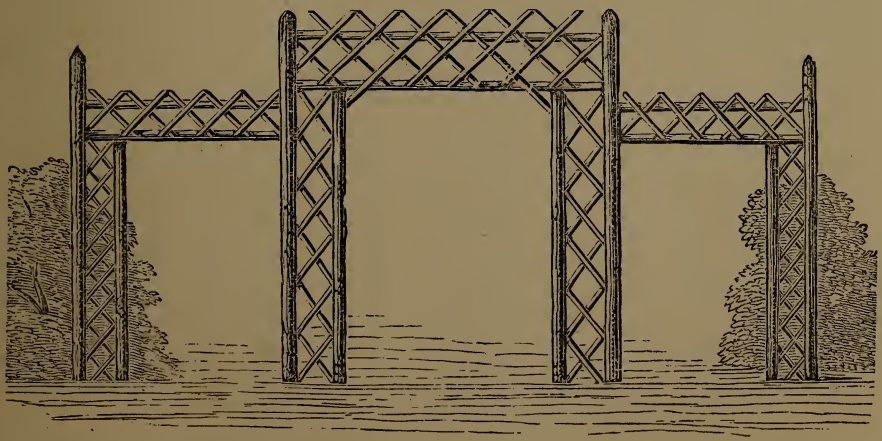
unbarked stems selected as to shape, or brought together so as to form a symmetrical span by a little judicious carpentry. An arch of this kind is represented at page 391; the construction is simple, but produces an agreeable effect by means of a few accessories. The base on each side of the walk is flanked by a rough lattice of selected tree loppings, and the walk leads to a lawn, in the centre of which stands a root ornament, covered with a profusion of trailing plants. This and the shrubberies beyond form a picture to which the arch acts as framework, and the eye is gratified by a judicious disposal of a few very simple elements. Contrivances of this sort are particularly useful in small gardens, where broad natural effects can scarcely be thought of.

Trellises are of many kinds, and have many uses. Before we go a step further, we will remind the reader that where climbing plants are trained over wood, brick, or stone, the adoption of a trellis is most desirable to save the destruction of the surface which must result from the use of nails and shreds. Eyelet nails are obtainable at all the good seed shops and ironmongers. These nails are driven in at suitable distances, and the wires passed through them to form the trellis. The climbers are tied to the wires by strips of bass or the soft lead wire manufactured for the purpose. If a wall is well wired in the first instance, there need not be another nail driven or drawn during the whole of a lifetime. When we have had to cover flat painted wood-work with vegetation, we have obtained large "pea risels," which are simply wire hurdles strongly made, and fixing these firmly, have extemporized a good and lasting trellis at the most trifling cost and with the least imaginable trouble. The figures which follow are intended simply as suggestions of trellises for the rosary, or to serve as screens, or even to facilitate the playing of games on a suitable plot of grass. They offer at least two advantages to the owner of a country garden, that the villager would have no difficulty in constructing either of them, and that in many instances materials for the purpose might be found wholly or in part in the rubbish yard.

The best "leading article" for all such work is unbarked larch, but that is by no means essential, for the clearings of the garden will ofttimes afford capital timber, and apple, pear, and plum, last long if sound, and answer admirably for rustic-work.

It is advisable to char and pitch the ends of posts that are to be planted in the ground, to prevent rotting. All wire-work employed should be stout, and instead of galvanized wire, which is so much employed, we should always prefer for home-made work common number one iron wire, and keep it always



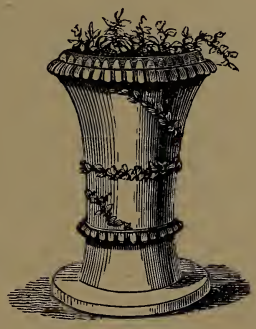


well painted, especially where joined or twisted, to prevent rust. There is some wear and tear in work well done with such wire as this, and the cost will not exceed that of a lighter material in galvanized wire.

Handsome wire structures are now prepared at low prices by manufacturers of horticultural ornaments, and these, when made to span paths, break angles, or heighten the interest of an object seen through them, are extremely useful. There are all sorts of climbers suitable for these arches, such as the aristolochia, clematis, evergreen and Boursault roses, creeper-vine, and many rapid-growing and free-flowering annuals.

Artificial Stone is not always to be depended on, for it is sometimes found to consist of common plaster coated with cement. This would not matter provided the duplex material would hold together with the integrity of a homogeneous mass. But it happens that when frost follows long continued rain, the outside cement and the inside plaster expand in different degrees, and when the thaw takes place they part company. Then the beauty of Venus and Adonis is seen to be but skin deep, and the gigantic vase from which the floral scrolls have fallen, has less elegance than the pile of clinkers that make hideous the grand entrance to a genuine cockney's garden. As remarked in a preceding page, however, artificial stones of many distinct kinds are now

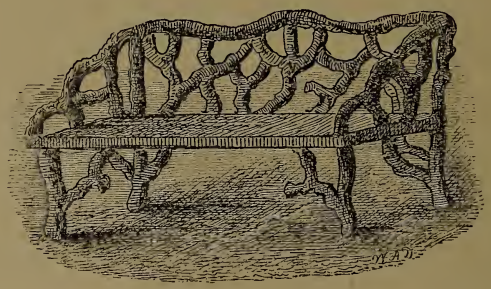
manufactured, and many of them equal stone both in durability and beauty of texture, so that unless we employ the sculptor to make demonstration of his skill in Carrara marble, we may do well to adopt these patented substitutes, which are as cheap as they are good, and for the most part cast in such artistic designs that they well merit to be regarded as works of art. We quite regret that our fixed rule of action precludes the recommendation of some of the patented stones, but the warning offered as to the compounds of cement and plaster may have some practical value for the reader. Iron of course answers well in place of stone if designed for the purpose, and kept in good condition by regular cleaning and painting. But the texture betrays it, and the paint is an undesirable accessory—we should always prefer for decorative works intended for pictorial uses only, stone, or its nearest imitation, to iron, but



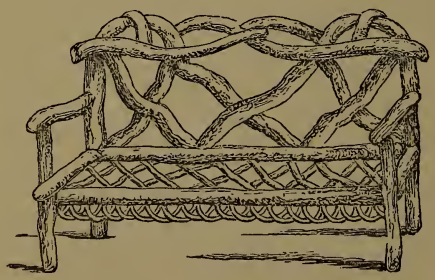
where a mechanical strain is to be borne, as in a balustrade or centlivre for example, iron of course will sweep every other material out of the field for strength and elasticity.

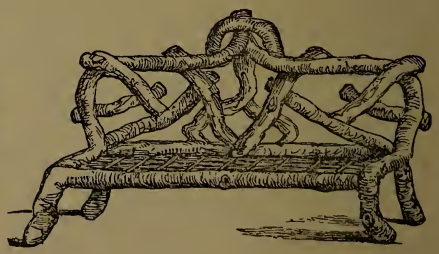
Rustic Furniture is often badly made, and of the worst materials. In purchasing expensive articles of this class it is necessary to guard against obtaining timber in which dry rot has commenced, though as to "guarding against" this contingency is no easy matter. Until within the past ten years or so, manufacturers in the eastern parts of London made use of cheap oak timber, the produce for the most part of the pollard oaks of Epping Forest. This soon began to decay within by dry rot, which seldom gave any outward sign, so that a rustic structure in which the process had long been active, would preserve its respectable appearance until the final collapse came, when it

would subside into a wreck, and, to the owner's surprise, be found to have long before consisted only of an outer shell of varnish or paint, and a mass of mere dust within. Those portions of the forest from which this treacherous timber was obtained are now enclosed and cultivated; but in many another district a similarly bad material may be in use to the injury of purchasers



and the discouragement of taste in gardening. We cannot propose a test for the guidance of the purchaser, although a section of the timber would probably reveal to a microscopist the presence of the fungus by which dry rot is produced. But having paid dearly for our knowledge of this stuff, we





advise the rejection of wood in which small worm-holes, like the piercing of pins, are visible, for these appear to precede and prepare the way for the insidious fungus. A good test of soundness is density: if the wood is heavy, and when struck gives forth a semimetallic ring, it is likely to be sound.

The best of timber, however, requires proper management in the workshop, or the work will not hold together, and decay will quickly attack the materials.

The seasoning process is the one grand step towards honest work in the making of rustic furniture, and the purchaser may sometimes be able to judge pretty fairly by the visible practice of the yard whether the wood is seasoned or not. In the remarks on various rustic ornaments we have recommended in some few instances the employment of unbarked poles, but we are bound to add here that for all general purposes it is better for the bark to be removed by steeping the wood in hot water, for it may peel off on its own account when the work has taken its final place in the garden, and render it unsightly, and a prey to weather. When the bark is removed, the timber presents a naturally polished surface, in many instances, as, for example, yew, holly, and oak, extremely beautiful, and susceptible of improvement by the application of a preservative coat of varnish. And here we will again remark

that wood in its natural colour, or at most with the improvement of a stain, is much to be preferred to painted wood, whenever circumstances admit of its use with propriety. Even common deal plank, when employed as the inner lining of a summer-house, only needs to be coloured with oak stain and varnished to present a fine mellow appearance, far more in unison than paint would be with a garden scene, especially if varnished yew, holly, and oak, and unbarked hazel rods and pine-cones, constitute the principal ornamental features. One word more on this subject. Varnish is varnish all the world over, and needs no explaining; but sometimes oil is rubbed in as a substitute, and another substitute is a mixture of gold size and boiled linseed oil. These are good preservatives, and afford a good tone of colour, but utterly inadmissible on any part of the wood-work which one's dress is likely to come in contact with. As to the oil, *pur et simple*, it generally sinks into the texture of the wood, but remains unabsorbed about the neighbourhood of hard knots, to make oily prints of those knots upon the backs of those who

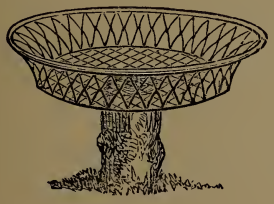
submit themselves for the operation. As for the second, it never becomes thoroughly hard, and on a hot summer's day, if you sit for half an hour leaning against a surface treated therewith, you may find it a difficult task to get away home again—you will be glued down like a limpet, and when pulled off by strong friendly hands, will surely find that you have left a photograph of the event in the form of a film of wool or what else on the treacherous varnish. Yet one word more. All receptacles for earth, such as baskets, etc., should be pierced to allow escape of surplus water, and should be

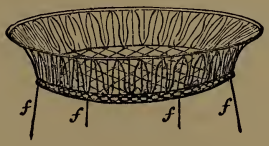
coated with pitch inside. So too the feet of all chairs, baskets, and so forth, should be touched with hot pitch sufficient to make the sole impervious to moisture, and when these are placed in positions they should stand on bricks or tiles, rammed into the proper places previously. By taking these precautions the life of your rustic work will be considerably prolonged.

Wire Work should of all things be strong, and suited to the particular purpose for which it is employed. Very much of the low-priced wire netting

we see advertised is worse than useless, for being frail and subject to decay and damage, we may some day lose all our pheasants or other valuable birds that have been entrusted to its keeping. In selecting wire netting for any particular purpose, it is a good plan to have the largest mesh allowable, and

to have the strongest work made of that size. Generally speaking, iron rods are preferable for the frame-work of an aviary to any kind of wood work, but the latter must be used more or less, and it is especially serviceable where anything like ornament is attempted. Galvanized wire has its uses, and is certainly not to be condemned; but the caution may be useful that the best





of it will not last for ever. What is it? Nothing more than iron coated with zinc, and consequently wherever the iron is exposed to the atmosphere, as it must be in places where the wire has been cut, there oxidation takes place, and decay proceeds at a rapid rate. Some of the better productions are galvanized after all the work of cutting and forming is complete, in order to give a coating of zinc to the joinings and rivets. But this is of course impossible with works of any great extent, and those who would build well

are advised to finish the work with two or three coats of paint, which should be renewed every third year.

Wire netting is frequently employed to confine poultry and ornamental fowl in narrow runs which scarcely deserve the name of aviaries, though in strict truth they are such. In constructing these, flat roofs should never be adopted, nor indeed should a flat roof in wire work be employed for any purpose in the open air. One heavy fall of snow, remaining a few hours on a flat wire roof, however strong, will be likely to weigh it down and drag the uprights with it out of gear, and may even bring down the whole affair with a crash, to the destruction perhaps of all the inmates.

Wire baskets, and even wire flower-pots, in endless variety of design, are offered by the manufacturers of garden ornaments, and, generally speaking, they are good. But strength is of the utmost importance, especially if they are intended to be filled with earth and planted. In the case of such baskets as are here figured, which are the most simple things imaginable, we should prefer never to put earth in them at all. If we had to furnish such with flowers, we should first give them a coat of tar to prevent destruction by damp, then fix two strong rods across to form a letter X horizontally, to give strength; then fill them with moss, and in that plunge potted plants.

Here our labours end. If the reader should derive but a hundredth part of the pleasure in the perusal of this book that it has already afforded the writer, there will be some little gain to the present life, which in its turn may tend to gain in a life exceeding this. Our own house and garden have furnished all the subjects, and nearly all the examples and illustrations. We might have done better, perhaps, by seeking afar off for what we preferred to find at home; and yet who knows, we might have done worse in picturing less familiar things, and deducing lessons from experiences not our own. We shall rest in the hope that this humble endeavour will be of service to some genial spirits, who will pardon its shortcomings for the sake of the object to which our labours have been directed—to establish nearer and dearer relations between the home and the country, between the heart of man and the glorious creation by which he is surrounded.

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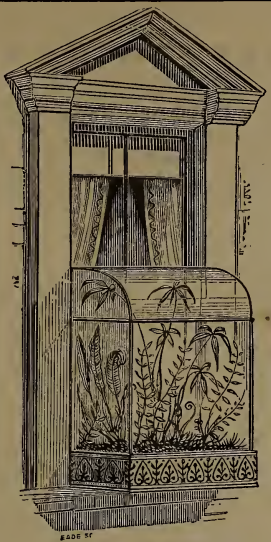

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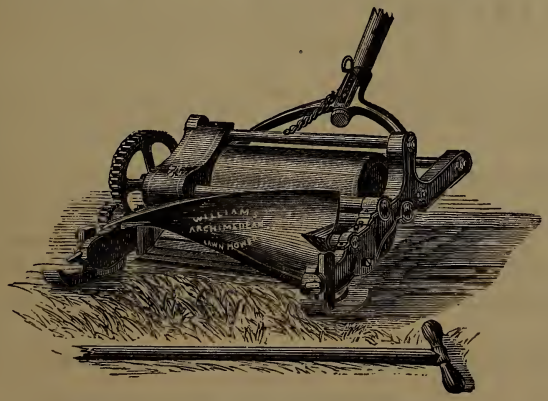

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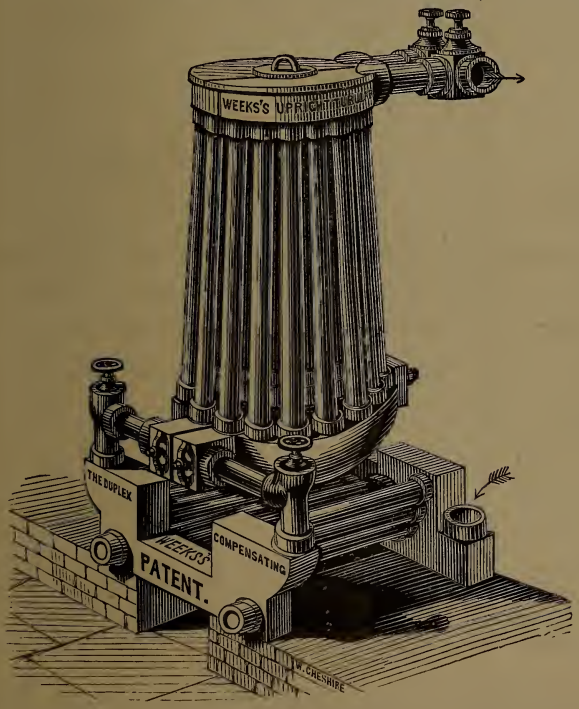

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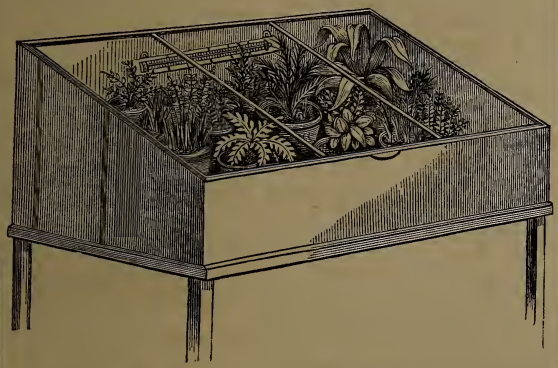

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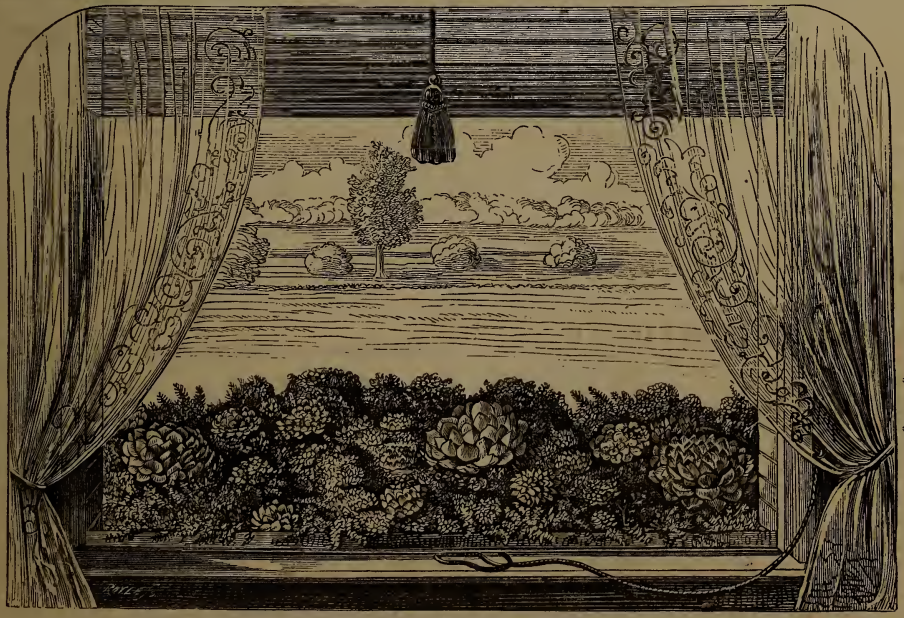

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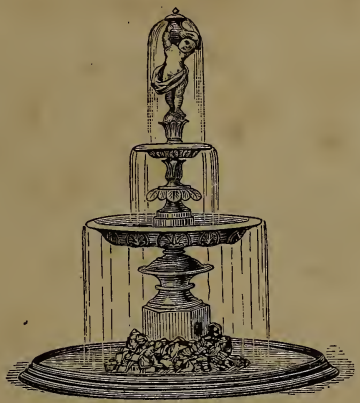

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